

London Cancer
Specialist Services
Reconfiguration:
A case for change in
specialist cancer services

October 2013

Contents

1	Executive summary	7
1.1	Introduction	7
1.2	Cancer in London	8
1.3	Why change is needed	9
1.4	The evidence base	10
1.5	How clinicians have formed their recommendations	12
1.6	Changes needed for each cancer pathway	14
1.7	How the <i>London Cancer</i> Board formed its recommendations	13
1.8	A pledge of support	16
2	Brain tumours	18
2.1	Summary	18
2.2	Background	19
2.2.1	<i>London Cancer</i>	19
2.2.2	Brain tumours	19
2.3	Current services	20
2.3.1	<i>London Cancer</i> services	20
2.3.2	Hospital volumes	21
2.3.3	Other services	21
2.4	Why we need to change	22
2.4.1	Surgical and hospital volumes – the evidence base	22
2.4.2	National perspective	23
2.4.3	London perspective	24
2.4.4	Local perspective	24
2.5	What we need to do	27
2.5.1	How would things be different if we change? – Local cancer units, GPs, community care and hospices	28
2.5.2	How would things be different if we change? – Specialist neuro-oncology surgery centres	28
2.6	The <i>London Cancer</i> Board recommendation to commissioners for Brain Cancer	29
2.7	The expected benefits for patients	29
2.8	The impact on patients	30
2.9	Appendix – patient numbers	31
3	Urology	33
3.1	Summary	33
3.2	Background	34
3.2.1	<i>London Cancer</i>	34
3.2.2	Bladder cancer	34
3.2.3	Prostate cancer	34
3.2.4	Kidney cancer	35
3.2.5	Other urological cancers	35
3.3	Current services	35

3.3.1	Hospital volumes – Bladder and prostate cancer	35
3.3.2	Hospital volumes – Kidney cancer	36
3.3.3	Other services	37
3.4	Why we need to change.....	38
3.4.1	Surgical and hospital volumes.....	38
3.4.2	National perspective	38
3.4.3	London perspective.....	38
3.4.4	Local perspective.....	39
3.5	What we need to do.....	39
3.5.1	How would things be different if we change? – Earlier diagnosis and better support	39
3.5.2	How would things be different if we change? – Specialist services	40
3.5.3	Why single specialist centres?	40
3.5.4	How the single specialist centres would work.....	41
3.5.5	How would things be different if we change? – Local units	42
3.5.6	How would things be different if we change? – The patient pathway	42
3.6	The <i>London Cancer</i> Board recommendation to commissioners for Urological cancers.....	44
3.7	The expected benefits for patients	46
3.8	The impact on patients	46
3.8.1	Bladder and prostate cancer.....	46
3.8.2	Kidney cancer	46
3.8.3	Travel and patient choice.....	47
3.9	Key considerations	47
3.10	Appendix – volume and outcome in urological cancers	49
4	Head and neck cancer	50
4.1	Summary	50
4.2	Background.....	50
4.2.1	<i>London Cancer</i>	50
4.2.2	Head and neck cancer surgery.....	51
4.3	Current services.....	51
4.3.1	<i>London Cancer</i> services	51
4.3.2	Other services	52
4.3.3	Hospital volumes.....	53
4.3.4	Non-surgical treatment.....	54
4.3.5	Rehabilitation.....	54
4.4	Why we need to change.....	55
4.4.1	Surgical and hospitals volumes – the evidence base	55
4.4.2	London perspective.....	55
4.4.3	Local perspective.....	56
4.4.4	Drivers for change	56
4.5	What we need to do.....	57
4.5.1	How would things be different if we change? – Strengthening local services	57
4.5.2	How would things be different if we change? – Discussing treatment options	57
4.5.3	How would things be different if we change? – Post-treatment follow-up in primary care	58
4.5.4	How would things be different if we change? – Consolidation of specialist surgery	58
4.5.5	Example patient pathway from the proposals.....	60

4.6	The <i>London Cancer</i> Board recommendation to commissioners for Head and Neck cancer	61
4.7	The expected benefits for patients	61
4.8	The impact on patients	62
5	Acute myeloid leukaemia services and haematopoietic stem cell transplantation	63
5.1	Summary	63
5.2	Background	64
5.2.1	<i>London Cancer</i>	64
5.2.2	Acute myeloid leukaemia	64
5.2.3	Haematopoietic stem cell transplantation (HSCT)	65
5.2.4	The scope of this review	66
5.2.5	Principles guiding the review of HSCT and acute myeloid leukaemia services	68
5.3	Current services	68
5.3.1	<i>London Cancer</i> services	68
5.3.2	Hospital volumes	70
5.4	Why we need to change	72
5.4.1	National and London perspective – Acute myeloid leukaemia services	72
5.4.2	National and London perspective – Haematopoietic stem cell transplantation	73
5.5	What we need to do	73
5.5.1	AML services	73
5.5.2	Haematopoietic stem cell transplant services	74
5.5.3	Key reasons why <i>London Cancer</i> supports changes to the way HSCT services are delivered across London	74
5.6	What this means for patients	76
5.6.1	Patients with acute myeloid leukaemia	76
5.6.2	Patients needing HSCT	76
5.6.3	Impact on patients during the transition of services	77
5.7	The <i>London Cancer</i> Board recommendation to commissioners for acute myeloid leukaemia services and haematopoietic stem cell transplantation	77
5.8	The expected benefits for patients	78
6	Oesophago-gastric cancer	80
6.1	Summary	80
6.2	Background	80
6.2.1	<i>London Cancer</i>	80
6.2.2	Oesophago-gastric cancer	81
6.3	Current services	82
6.3.1	<i>London Cancer</i> services configuration	82
6.3.2	Other services	82
6.3.3	Hospital volumes – current figures	82
6.4	Why we need to change	83
6.4.1	National perspective	83
6.4.2	London and local perspective	83
6.5	What we need to do	84
6.6	The <i>London Cancer</i> Board recommendation to commissioners for Oesophagus and Gastric cancer surgical services	84
6.7	The expected benefits for patients	85

6.8	The impact on patients	86
7	Next steps.....	87
8	Glossary	88
8.1	Brain tumours.....	88
8.2	Urology	88
8.3	Head and neck cancer	89
8.4	Haematopoietic stem cell transplantation and acute leukaemia services	94
8.5	Oesophago-gastric cancer	95
9	Appendices	97
	Appendix 1: The Model of Care for Cancer Services – Addendum to the Clinical Paper.....	97
	Appendix 2: Specialist urological cancer centres – the clinical evidence.....	125
	Appendix 3: A letter of support	158

Glossary of terms

Acronyms of hospitals and trusts

- Barking, Havering and Redbridge University Hospitals NHS Trust (BHRUT)
 - Queen’s Hospital, Romford (Queen’s or QH)
- Barnet and Chase farm Hospitals NHS Trust (BCFH)
 - Chase Farm Hospital
- Barts Health NHS Trust (BH)
 - Newham General Hospital
 - Royal London Hospital, Whitechapel (RLH)
 - St Bartholomew’s Hospital (SBH)
 - Whipps Cross University Hospital (Whipps Cross)
- Homerton University Hospital NHS Foundation Trust
- North Middlesex University Hospital NHS Trust (NMUH)
- Princess Alexandra Hospital NHS Trust (PAH)
- Royal Free London NHS Foundation Trust (RFL)
 - The Royal Free Hospital
- University College London Hospitals NHS Foundation Trust (UCLH)
 - University College Hospital (UCH)
 - National Hospital for Neurology and Neurosurgery, Bloomsbury (NHNN)
- Whittington Health NHS Trust

1 Executive summary

This clinical case for change sets out how we as clinicians across north central and east London and west Essex believe we can achieve the best for every patient with a rare or complex cancer that requires specialist care, no matter where that patient lives. It demonstrates that there is unacceptable variation in the quality of, and outcomes from, specialist cancer services in the region, and that by reconfiguring these services, there is an opportunity to deliver world-class care and measurable improvements in the health and wellbeing of the population.

The proposed improvements cover the whole system of care for patients with cancer, including whole pathways from diagnosis, referral, treatment, follow-up and long-term care. It builds on the significant work undertaken across London over the last five years, which recommended, with broad clinical and stakeholder consensus, that key aspects of specialist clinical services for rare and complex cancer types – particularly specialist cancer surgery – should be consolidated in a series of world-class specialist centres, whilst ensuring that patients continue to receive as much of their care as close to their homes as possible.

We believe that these proposals would deliver the significant benefits for patients including improved clinical outcomes in the short and long-term, improved experience of services, increased access to the latest treatments, technology and clinical trials, and a consistent level of care no matter where a patient lives and first receives care.

We welcome your views, feedback and comments on our recommendations for improving specialist cancer services for our population of 3.2 million people.

“London is a world-class city and every single Londoner with cancer deserves world-class care. But the configuration of our specialist cancer services in too many smaller centres makes it impossible for our clinical teams to do their best for patients. This is frustrating for everyone; we need a paradigm shift, and are convinced by evidence that consolidating complex and specialist cancer services in a small number of world-class specialist centres where all the experts can work together in high volume teams is the way to achieve it. Such teams will also have the capacity to strengthen expertise and access to innovation at local hospitals.”

Professor Kathy Pritchard-Jones, Chief Medical Officer of London Cancer

1.1 Introduction

There is a strong international clinical consensus that centres treating a large number of patients with a particular type of cancer produce better patient outcomes than those that see fewer patients.

Reaching the number of patients to achieve these ‘high volume’ benefits is not possible for centres treating rarer or complex cancers, unless they each serve a very large population. For this reason, best practice and NICE guidelines recommend minimum patient volumes for specialist cancer centres and minimum numbers of surgical procedures that should be carried out each year. In striving to meet this guidance, some concentration of services has occurred in London.

For historic reasons, the north central and north east London and west Essex population is split between many smaller specialist centres – some of which do not achieve best practice or NICE guidelines. For this, and other reasons, clinical outcomes and the patient experience for rarer and complex cancers in the region fall short of much of the rest of the country, and the high standards that local patients should expect. Smaller centres also lack the scale to make investments in the latest equipment and technology or to cover shift systems sustaining high quality care, 24/7.

We want to change this.

As clinicians, our priority is delivering the best possible care for our patients. Together, we are working across the region and we believe that **specialist services for rare and complex cancers should be focused in fewer centres that meet international best practice**, in terms of the number of patients they see, the amount of time clinicians are able to spend undertaking highly specialist procedures and clinics, and other key criteria set out in this case for change. We believe that we have a unique opportunity to make our cancer services truly world-class.

Proposals for services for the individual cancer types below are described in detail in this case for change, in the context of the advantages of centralising specialist cancer services in north central and north east London and west Essex:

- Brain
- Urology (bladder, prostate and kidney)
- Head and neck
- Haematology (bone marrow transplant and acute myeloid leukaemia)
- Oesophago-gastric (stomach and oesophagus)

1.2 Cancer in London

Over the last decade, good progress has been made in cancer care and there are areas of excellence in north central and north east London and west Essex. However, there is still much more to be done to ensure that cancer outcomes across the region become among the best in the world.

In March 2010, Commissioning Support for London, within the London Strategic Health Authority, published a London-wide *Case for Change*¹ based on the compelling arguments for changing cancer services in London made by the capital's cancer clinicians. Following the publication of the London-wide *Case for Change*, a response written by 45 lead cancer clinicians was issued in August 2010, outlining the requirements of London's cancer commissioners: the *Model of care for Cancer Services*². An *addendum* to the clinical paper was issued in January 2012.³

As clinicians working together through *London Cancer* – an integrated cancer system for north and east London and west Essex – we aim to address the challenges and implement the recommendations highlighted in the London-wide review. The context is clear:

The demand for cancer care

Every year, over 27,000 Londoners are diagnosed with cancer, and around 13,600 people die from

¹ <http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-case-for-change.pdf>

² <http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-model-of-care.pdf>

³ The Model of Care for Cancer Services – Addendum to the Clinical paper. London Health Programmes, January 2012. See *Appendix 1*.

the disease. The number of new cancer cases each year in London is predicted to increase to 28,500 in 2022. London has a lower cancer incidence than the national average (286 per 100,000 compared with 301 nationally) because the capital's population is younger than the national average.

Cancer patients in London have relatively poor clinical outcomes

Over recent years, improvements in one-year survival in the region have lagged those reported in England as a whole (Office for National Statistics 2011). The London-wide review estimated that there are 1,000 avoidable deaths from cancer in London every year, and this could be addressed in part by radically re-organising care. Cancer incidence and cancer survival vary significantly within London and between ethnic and socio-economic groups.

Despite a significant volume of research taking place locally, less than one-quarter of existing cancer patients participate in clinical trials during their treatment, which are associated with improved outcomes.

Cancer patients report a relatively poor experience

The national Cancer Patient Experience Survey 2012/13 shows that many of the communities in the region report a poorer experience of cancer care compared with other regions of England, with 9 of the 10 of the lowest performing trusts located within London. Poorer patient experience is closely associated with the interface between community and hospital services.

1.3 Why change is needed

As clinicians, we believe that the current clinical configuration is not delivering the best clinical outcomes and experiences for patients for the following reasons:

Fragmentation of services – the spread of the region's cancer services is the result of historical developments at various hospital sites. This has taken place without a framework to consider how services could fit into an overarching system that can best serve the entire regional population.

Insufficient planning of services – the region's existing specialist cancer services do not make the most efficient use of the limited and highly skilled workforce. As a result, patients in the region have not fully benefited from advances in medical care as specialist staff, facilities and patients are spread across too many sites. For some rarer cancers and those requiring specialist care several London hospitals are providing services for the relatively small number of cases seen in the capital each year. Consolidating these specialist services into fewer hospitals would create and maintain the complete clinical environments that can enable the delivery of best practice.

Workforce pressures – high turnover, high vacancy rates, and lower labour productivity are some of the region's unique workforce challenges. Its doctors and nurses see fewer patients than those working elsewhere in England.

Unequal access to clinical trials and new treatments – the numerous high quality research active providers in the region present the opportunity to consolidate expertise into high volume, high capacity teams that can support local involvement in cancer biomedical research, and increase participation in clinical trials for patients who might otherwise not have ready access to them.

Insufficient specialisation to make the most of medical advances – the ability to prevent, diagnose and treat medical conditions is constantly improving. Much of this advanced medical treatment depends on better technology and equipment, operated by more specialist clinicians. A recent

report by the Kings Fund⁴ underlines how advances in medicine and surgery have led clinical staff and equipment to become more specialised, leading to more specialist teams brought together in fewer, larger hospital sites so that skills can be maximised and outcomes improved.

The most complex clinical cases require a range of diagnostic and treatment equipment to be available in one place. This would require locating high technology equipment in centres of expertise with sufficient concentrations of experienced trained staff, and where there are enough cases, to justify the technology's cost⁵.

Clinical teams lacking the capacity to operate 24/7 shift patterns – currently, specialist consultants are spread across many hospitals and as a result there is insufficient manpower at each individual hospital to cover its own consultant-led rota.

1.4 The evidence base

As clinicians in *London Cancer*, we have considered the available literature and evidence from academic sources, as well as pilots and innovative initiatives. Where evidence was not available, recommendations are based on the consensus of the nationally and internationally renowned clinicians that the region is fortunate to have.

The most compelling evidence is that for complex procedures there is a positive relationship between the volume of patients that cancer services see and the outcomes that they achieve. Higher patient volumes also improve the research environment, particularly for rarer cancers. There is evidence that cancer patients who participate in clinical trials can have better outcomes. Generally all patients treated in an environment that undertakes clinical research do better, whether or not they are part of a clinical trial.

“Clinical trials are important to us as patients because we believe that they are key to improvements in cancer treatments and outcomes. People are keen to participate in clinical trials for a variety of reasons. Some people hope a trial will lead to improved outcomes for themselves, while for others it’s about improving treatments for future cancer patients. It’s also a way to turn the negativity of a cancer diagnosis, and the difficulties of cancer treatment, into a positive contribution to the ongoing work to bring cancer into the realms of a chronic (or curable) illness.”

Elizabeth Benns, member of Independent Cancer Patients’ Voice and a non-executive director on the board of *London Cancer*

Specialist centres are now seen as vital for the maintenance of a clinical environment that delivers best practice and fully exploits future advances in knowledge and treatments.

1.4.1 Evidence making the link between improved outcomes with large specialist centres

There is strong evidence to suggest perioperative mortality and long-term survival worsen as hospital surgical volume decreases.⁶ Numerous studies in recent decades have examined the

⁴ Reconfiguring Hospital Services 2011

⁵ NHS London, Healthcare for London: A Framework for Action, 2007

⁶ K Bilimoria, DJ Bentram, JM Feinglass, et al, ‘Directing Surgical Quality Improvement Initiatives: Comparison of Perioperative Mortality and Long-Term Survival for Cancer Surgery’, *J Clin Oncol*, 2008, 26:4626-4633

relationship between high volume hospitals, long-term survival and perioperative mortality, including for complex cancer services.^{7,8}

The following studies demonstrate high volume hospitals have better outcomes for major cancer resections and other high-risk procedures:

- A recently published study scrutinised 135 published studies covering a range of 27 surgical procedures or clinical conditions, and looked at both hospital volume and doctor/surgeon volume for the condition studied⁹. The report concluded that most of these studies highlighted a direct relationship between volumes and improved outcomes. This was most marked in complex or high risk procedures, such as complex surgery and cancer treatment
- A US literature review of urological cancer surgery concluded higher hospital volume is associated with better outcomes¹⁰
- A systematic review evidenced an inverse relationship between hospital surgical volume and mortality¹¹. In five evaluations in a decade, hospital mortality rates were between 13.8% and 16.5% in hospitals with less than five pancreatic resections per year. However, hospital mortality rates were between zero and 3.5% in hospitals with more than 24 pancreatic resections per year.
- A review of provider volumes and outcomes for cancer procedures in the UK undertaken in 2005 found that high volume providers had significantly better outcomes for complex cancer surgery, particularly pancreatectomy, oesophagectomy, gastrectomy and rectal resection.

1.4.2 Other factors contributing to improved clinical outcomes from consolidated specialist services

Volume is only one of a number of factors. The London-wide *Case for Change* notes that other factors including training and experience, complementary surgical teams, hospital resources, organisation and processes of care can also influence clinical outcomes. It is fundamental that specialist services have high availability and are delivered by appropriately qualified teams with sufficient practice to maintain their skills and sustain expertise. Centralisation of specialist cancer services would provide a means of consolidating scarce specialist expertise to improve clinical quality. Such concentration of care, with larger numbers of patients, creates centres of excellence that support training and provide cover to ensure consistently safe staffing levels that meet working time requirements.

Critical mass also provides the basis for the meaningful audit of outcomes, which cannot be precisely measured in small volume services. A single specialist team and higher volumes would allow better assessments of outcomes and, subsequently, more sophisticated outcome measures with narrow confidence intervals to enable benchmarking and international comparison. This would be achieved through recording data over time as systems are established and service infrastructure is developed.

⁷ HS Luft, JP Bunker & AC Enthoven, 'Should operations be regionalized? The empirical relation between surgical volume and mortality', *N Engl J Med.*, 1979, 301:1364-9

⁸ CB Begg, LD Cramer, WJ Hoskins & MF Brennan, 'Impact of hospital volume on operative mortality for major cancer surgery', *JAMA*, 1998, 280:1747-51

⁹ EA Halm, C Lee, MR Chassin, 'Is volume related to outcome in health care? A systematic review and methodologic critique of the literature', *Ann Intern Med*, 2002, 137:511-52

¹⁰ M Nuttall, et al, 'A systematic review and critique of the literature relating hospital or surgeon volume to health outcomes for 3 urological cancer procedures', *The Journal of Urology*, 2004

¹¹ T van Heek, et al, 'Hospital Volume and Mortality After Pancreatic Resection', *Ann Surg*, 2005, 242(6): 781-790

1.5 How clinicians have formed their recommendations

One of the themes of the Department of Health's *Cancer Reform Strategy*¹² in 2007 was that routine healthcare should take place as close to home as possible while more complex care should be centralised:

“New models of care can bring considerable advantages to patients. [There are] a range of ways in which service models for cancer could be improved, based on two key principles: first that care should be delivered locally wherever possible to maximise patient convenience; and second that services should be centralised where necessary to improve outcomes.”

Cancer Reform Strategy, Department of Health, 2007

At its meeting in July 2009, the London Commissioning Group asked Commissioning Support for London to bring together London's cancer community to propose changes to services in the capital in line with the Cancer Reform Strategy. The *London Case for Change*¹³ and *Model of care for cancer services*¹⁴ were produced following this in 2010.

In 2012, the integrated cancer system (ICS), *London Cancer* – one of two serving the capital – was commissioned to oversee provision of cancer services for a resident population of 3.2 million in north central and north east London and west Essex. It was tasked by commissioners to implement the London wide Model of Care, and has developed detailed proposals to achieve this. The proposals – outlined in this case for change – are in line with *London Cancer's* commitment to deliver a service that provides amongst the best clinical results in the world at a population level. As clinicians, we have a determination to go beyond the standards set in the London-wide *Model of Care*. We believe the region's services should serve optimal populations rather than just minimum populations, as outlined in NICE guidance. To achieve this would create services and outcomes for patients that are comparable with international centres of excellence.

By co-creating the mandate for improving cancer outcomes and services across each cancer pathway, *London Cancer* has established a groundswell of clinical commitment and patient and primary care engagement to advance each programme. It was able to do this by bringing together the region's GPs, secondary and tertiary care providers in a formal governance structure, which also harnesses the expertise of leading cancer academics, patient representatives and charities. *London Cancer* has attracted the region's top health professionals and academics to collaborate and deliver long-term, sustainable improvements in cancer care.

Instead of fitting patients to historic services, the proposed changes start with the needs of the population – defining the critical mass of patients required to sustain specialist centres capable of delivering the highest international standards in clinical outcomes, patient experience, research and education and training for the next generation of specialist cancer clinicians.

A principal theme of the London-wide *Case for Change* is that the future improvement in the treatment of cancer patients would be best supported by specialist cancer services being provided by fewer teams with a higher concentration of expertise and the associated larger workloads.

¹² Department of Health, *Cancer Reform Strategy*, 2007

¹³ <http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-case-for-change.pdf>

¹⁴ <http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-model-of-care.pdf>

The London-wide *Model of Care* further recommends a reduced number of centres for specialist aspects of cancer surgery and complex treatments. All recommendations in the *Model of Care* advocate further consolidation of surgical services based on a set of clear principles:

1. It is the ambition of London's NHS to provide consistent **world-class** services.
2. The integration of research with clinical care is essential for the continuous improvement in the provision of high quality services. Consolidation of services would improve the research environment. **Specialist and rarer cancer services should be linked to high quality cancer research institutions that can demonstrate and improve uptake to clinical trials, introduce and access innovation more rapidly**, and promote translational research in the cancer field including, where appropriate, Academic Health Science Centres (AHSCs) and specialist cancer organisations.
3. Consolidating services reduces duplication of effort and equipment and dilution of expertise.
4. NICE Improving Outcomes Guidance (IOGs) recommends minimum volumes for a variety of services. Where services have been rationalised, London **should aim to go beyond** the minimum volumes laid out in NICE IOGs.
5. London is more densely populated than other areas of the country and should therefore aspire to **exceed recommended national minimum volumes**.
6. The population served by London's NHS is swelled beyond the eight million people resident within the metropolitan area by inflows of patients from outside the capital, particularly for complex treatments and rare conditions.

The *Addendum to the Model of Care* identified optimal surgical service co-locations:

- All specialist cancer services have a dependency with the general service for that tumour type (for example, specialist lung cancer surgery has a dependency with thoracic surgery)
- Liver cancer surgery with pancreatic surgery
- Pancreatic cancer surgery with liver surgery
- Specialist gynaecological cancer surgery with bladder and prostate surgery
- Soft tissue sarcoma (for retroperitoneal sarcoma surgery only) with: oesophageal gastric surgery, bladder and prostate and renal surgery (specialist urology).

Case study: How consolidating stroke services in London demonstrates the potential for cancer

New research has shown that centralising acute stroke services in particular London hospitals has led to significant reductions in both mortality and costs.

Before 2010, stroke services in London were provided in 30 acute hospitals across the region. After July 2010, a new multiple hub-and-spoke model for acute stroke care was implemented across the whole of London, with continuous specialist care for patients during the first 72 hours following a stroke provided at eight hyper-acute stroke units (HASUs).

The researchers found that the predicted survival rates at 90 days were 81.5% before the new model was implemented, and 88.7% after. After adjusting for the reduction in stroke mortality that had occurred elsewhere in the UK, it was calculated that there was a relative reduction in deaths of 12% after the new system was implemented. This means that over 400 lives in London were saved since 2010. In addition to saving lives, the stroke model is improving care for patients along the whole pathway from prevention and treatment through to rehabilitation.

1.6 Changes needed for each cancer pathway

In order to meet the significant challenges identified in this case for change, as clinicians we believe it is necessary to reconfigure specialist cancer services associated with each of the following pathways, in line with the London-wide *Model of Care*.

Through system-wide, multi-professional discussions involving patients and primary care in clinically-led 'technical subgroups' or working groups of *London Cancer's* Cancer Pathway Boards, detailed specifications have been developed for each pathway. This is in adherence with the process defined by commissioners at the end of 2011¹⁵.

The pathway specifications are planned around patient need and the motivation to reach 'global excellence', and address all aspects of the pathway, across all care settings - both centralised services and the other key aspects of care, which would continue to be provided in high quality local units as close to patient homes as possible.

A diagram on page 16 summarises the approach *London Cancer* has taken to identify the preferred model of care for the local population in cancer, using the organising principles of the *London Model of Care* and the *London Case for Change* that makes this compelling. The individual cases for change, which build on the pathway specifications for each cancer pathway, are detailed in the following chapters.

The cases for change for each of the individual cancer pathways can be divided into those for which the compelling argument for changing the number and/or location of centres relates to improved clinical outcomes and patient experience for cancer patients from consolidated surgical services, given that the evidence supports higher surgeon and hospital numbers delivering better outcomes. These are:

- Bladder/prostate cancer
- Renal cancer
- Oesophago-gastric cancer
- Head and neck cancer
- Brain cancer

Other cases for change are compelled by the need to consolidate facilities and expertise to ensure safe and sustainable services for cancer patients, although this may go hand-in-hand with improved outcomes from larger volume centres. These are:

- Haematological cancers: haematopoietic stem cell transplantation and acute myeloid leukaemia
- Head and neck cancer
- Brain cancer

¹⁵ Integrated cancer systems in London: Guidance on delivering service change, London Health Programmes, December 2011.

1.7 How the London Cancer Board formed its recommendations to NHS England (London Region)

Following finalisation of the optimum pathway specification for each cancer type, according to the process described in sections 1.5 and 1.6, *London Cancer* put out a call for applications to host these specialist services. The process and timetable was agreed in advance with all trusts and is summarized in the figure on page 16.

The *London Cancer* Board considered applications for the cancer services being consulted on in this document at the following Board meetings:

London Cancer Board meeting date	Specialist cancer type	Trusts applying to host specialist surgery	Trusts applying to host specialist oncology
10 Oct 2012	Urology (Bladder, prostate, renal) – first stage	BH (renal only) BHRUT (renal and bladder/prostate) RFL (renal only) UCLH (Bladder/prostate only)	
4 Feb 2013	Urology (renal) – second stage	BH RFL	
3 July 2013	Head and Neck	UCLH	
3 July 2013	Upper GI (OG)	BH BHRUT UCLH	
7 August 2013	Brain and spinal tumours of nervous origin	BHRUT (for Essex area) UCLH (for <i>London Cancer</i> area)	
7 August 2013	Haemopoietic stem cell transplantation & level 3 therapies		BH UCLH
7 August 2013	Level 2b units providing intensive therapy for AML		BHRUT BCF

Full details of the recommendations made and the basis on which they were taken are available in the public minutes of the relevant *London Cancer* Board meeting, available at <http://www.londoncancer.org/about-us/london-cancer-board/meeting-papers/>. This whole approach to improving cancer services for the population we serve has only been possible due to an unprecedented level of commitment from our clinicians and partner trusts to a new way of working together to maximize patient benefit. Some of the proposed changes require consideration of non-cancer services and this is being done in conjunction with the UCL Partners Medical Directors forum.

A summary of the recommendations for each cancer type is given in the relevant section of this document. All applications were subject to expert clinical scrutiny by members of the *London Cancer* pathway boards and technical subgroups, who are the experts for each disease area within our system. Where more trusts applied to host a specialist service than the required number of centres,

then the Board sought external expert advice. For the cancer services being consulted on in this document, this was necessary in the case of renal cancer and oesophago-gastric cancer surgery.

1.8 A pledge of support

As the clinical leaders of specialist cancer care and research across the *London Cancer* areas, we have thoroughly welcomed this opportunity to work with patients, primary care and commissioners to define our ambition to improve our services and to propose what we believe would finally achieve truly world-class services for local people with cancer. As leaders entrusted with taking forward cancer care, we commit to working collaboratively and in the best interests of our patients at all times to realise these benefits and to measure their impact on outcomes and experience openly and with a drive for constant improvement.

We hope that our vision and arguments are clearly articulated here, and look forward to engaging with stakeholders over the coming months consider how to drive forward such important proposals.

Professor Kathy Pritchard-Jones, Chief Medical Officer, *London Cancer*

Mr. John Hines, Pathway Director, Urological Cancer

Professor Muntzer Mughal, Pathway Co-Director, OG Cancer

Mr. David Khoo, Pathway Co- Director, OG Cancer

Mr. Simon Whitley, Pathway Director, Head & Neck Cancer

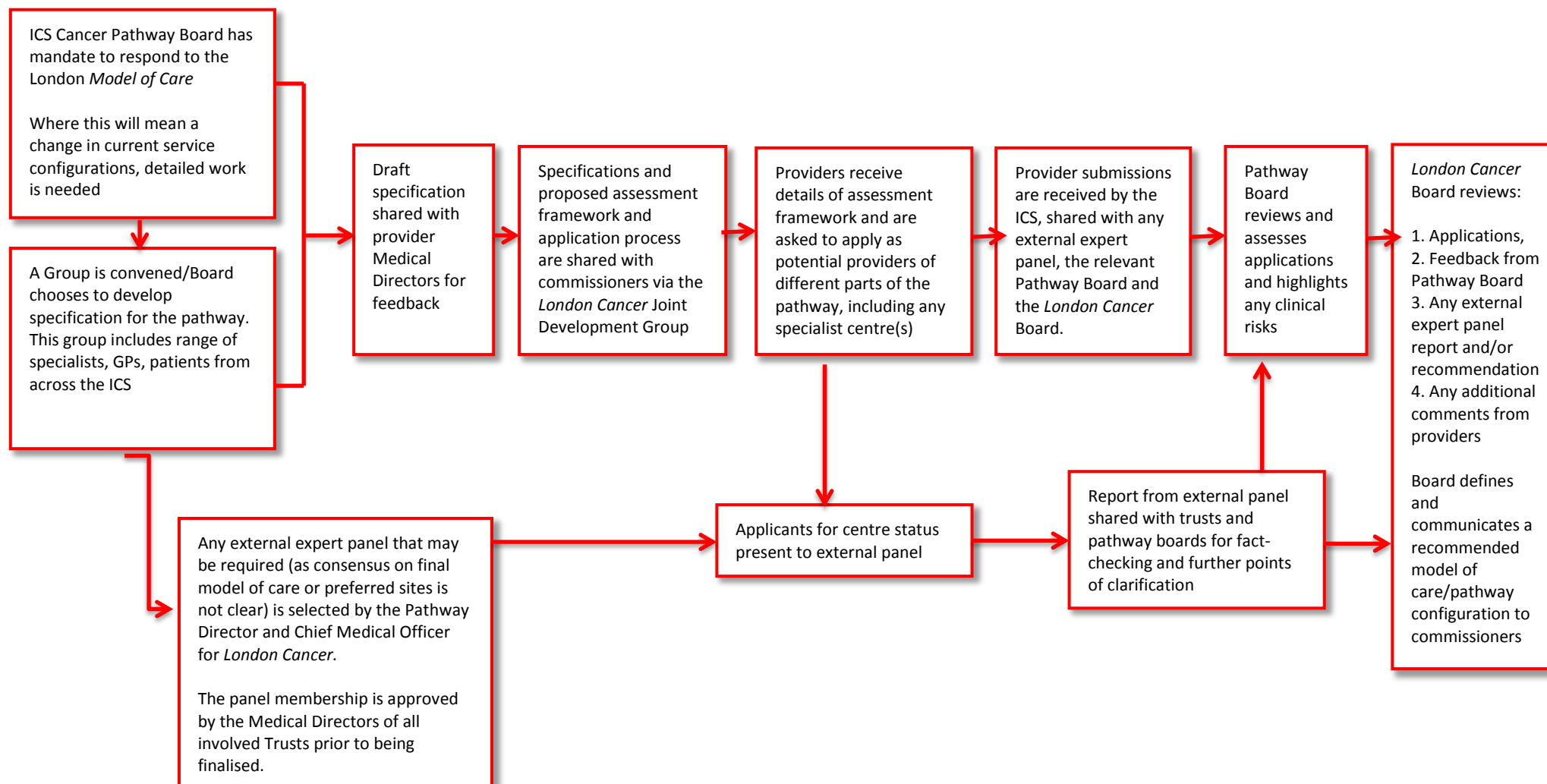
Mr. Andrew Elsmore, Pathway Co-Director, Brain & Spine Cancer

Dr. Jeremy Rees, Pathway Co-Director, Brain & Spine Cancer

Dr. Kirit Ardeshta, Pathway Director, Haematological Cancer

October 2013

Forming a recommendation on the future configuration of specialist cancer services



2 Brain tumours

2.1 Summary

Across North East and North Central London and West Essex – a population of 3.2 million just over 1000 people receive surgery for a brain or spinal tumours each year. These patients require not only specialised surgery but high levels of support and follow up care.

Within the *London Cancer* region there is the expertise and facilities to provide the highest quality of care to its population but currently the configuration of the services does not allow this to be realised. The clinicians at *London Cancer* agree a way forward for the future and a vision that would ensure the best possible outcomes and experience for our patients.

The vast majority of suspected brain tumours are admitted through an emergency route. When a brain tumour is identified immediate contact is made with a neuro-oncology surgical centre and the patient's on going care is arranged and organised immediately. If a suspected brain tumour patient is identified within a local hospital clinic, an immediate referral will be made to a neuro-oncology surgery centre. For GPs, suspecting a brain tumour they will use the appropriate NICE referral guidance and the agreed *London Cancer* forms in considering an urgent referral.

Our clinicians recognise that the hospitals currently cannot all provide the high standard of service needed for patients with brain tumours. It is therefore proposed that the number of surgical sites would change from three to two specialist neuro-oncology surgery centres in the *London Cancer* region:

- One neuro-oncology surgery centre would cover the population of outer north east London and Essex
- One neuro-oncology surgery centre would cover the *London Cancer* population of inner London.

By consolidating the services onto two sites both hospitals would have critical mass to address the limitations observed in current services and this would ensure improved patient experience and outcomes. Every brain tumour patient would have access to a clinical nurse specialist, neuro-surgeons undertaking neuro-oncology surgery would do so for a significant proportion of their time and the neuro- pathology services would be able to operate to the high standards required.

The two neuro-oncology surgery centres would work closely with local cancer units and oncology centres in *London Cancer*, and the areas neighbouring it, to ensure that patients have as much of their treatment and follow-up care as close to home as possible. The current neuro-oncology surgery centre that ceases to carry out surgery would continue to provide oncology services.

This section makes the case for changing brain cancer services across North East and North Central London and West Essex and describes the positive difference that can be made to patient's lives and their experience of care.

2.2 Background

2.2.1 London Cancer

We, the clinical experts in treating patients with brain cancer locally, have developed these proposals by working together as the *London Cancer* Brain and Spine Pathway Board. Representatives of all of our NHS trusts within *London Cancer* that provide brain tumour services were involved in their development. These are:

- Barts Health NHS Trust
- Barking, Havering and Redbridge University Hospitals NHS Trust
- University College London Hospitals NHS Foundation Trust.

We have great strengths to many of our services at present, but believe that things can be better for local people, and have all made a commitment to work together and make change to achieve this.

2.2.2 Brain tumours

There are many different types of brain tumours¹⁶. They are usually named after the type of cells they develop from or the area in which they are growing. Brain tumours are graded according to how quickly they are likely to grow (grade 1 being the slowest growing, grade 4 the fastest). Tumours may also be described as benign or malignant, generally correspond to low grade and high grade, respectively.

In other types of cancer we can quite easily say that tumours are “benign” or “malignant”. The distinction is less clear in brain tumours. For example, some low grade, or slower growing, tumours can spread to other parts of the brain or spinal cord. In addition, radiotherapy and chemotherapy are sometimes used to treat benign tumours. Even slow growing tumours can cause serious symptoms and be life threatening if they are in important areas of the brain.

In 2010, 9,156 people in the UK were diagnosed with brain, other central nervous system and intracranial tumours and there were 4,897 deaths from these tumours¹⁷. In 2005-2009, 15% of adult brain cancer patients (14.5% of males and 16.1% of females) in England survived their cancer for five years or more¹⁸.

Brain tumour patients are usually identified when they have a severe symptom and present to health services as an emergency in local accident and emergency departments. GPs sometimes refer patients to hospitals with suspected brain tumours, but these patients are very rarely found to have tumours. A patient with a suspected brain tumour identified on a CT (computerised tomography) scan at their local hospital would be transferred to a specialist neuro-oncology surgery centre. This centre has all of the investigations, staff and services necessary to confirm the diagnosis and agree a management plan, as appropriate.

Once they reach a centre, our patients are all discussed in a neuroscience multidisciplinary team (MDT) meeting. They may be discussed in a more specialised MDT meeting where the tumour is known to be in the pituitary gland, at the base of the skull, or in the spine. Patients will commonly have neuro-surgery to remove the tumour or reduce its size. A full diagnosis of the tumour type and its grade of malignancy are often not known until it has been analysed after surgery. The multi-

¹⁶ These proposals apply to tumours involving the central nervous system which includes brain. Spinal cord tumours, primary and secondary tumours in the bones of the spine are not part of this recommendation.

¹⁷ CRUK: CancerStats

¹⁸ Ibid.

disciplinary meeting would discuss not just the surgery but also the non-surgical parts of the management plan (radiotherapy, chemotherapy, supportive care), and consider the holistic needs of patients and their personal situation to ensure that its plans take these into account.

2.3 Current services

2.3.1 London Cancer services

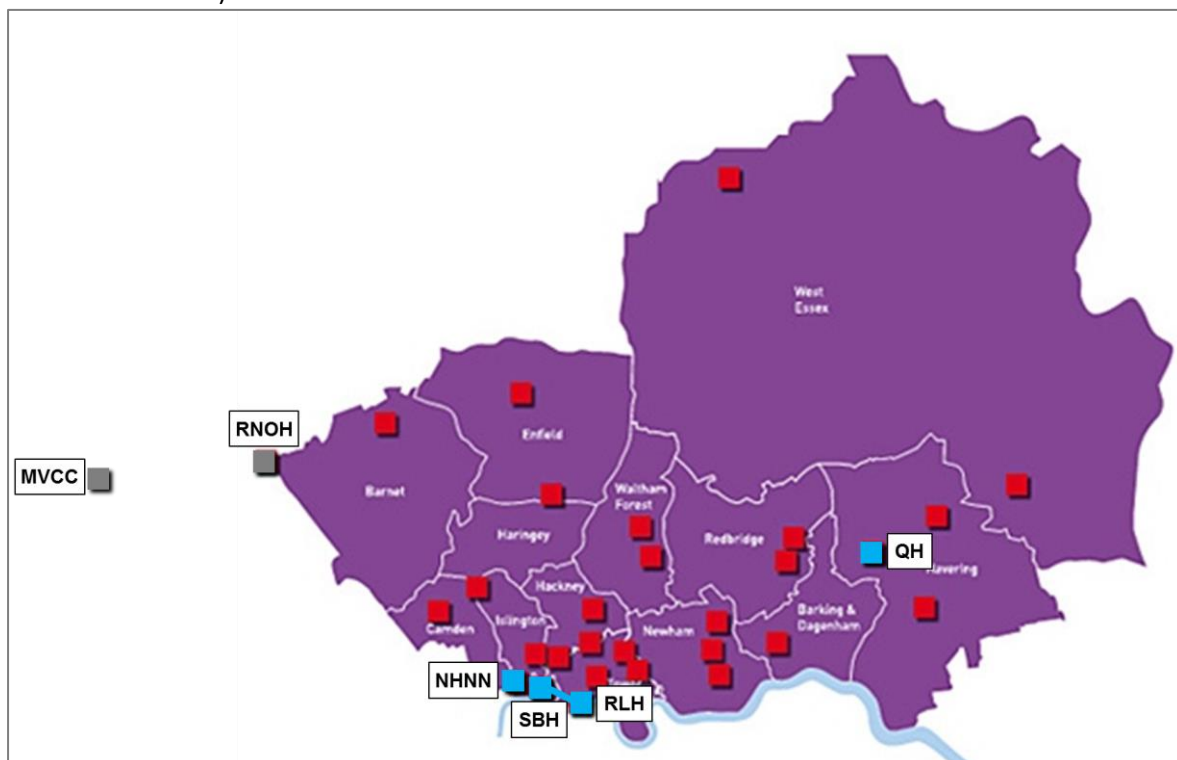
Three hospital trusts in the *London Cancer* area host neuro-oncology surgery centres for brain cancers:

- Barking, Havering and Redbridge University Hospitals NHS Trust (BHRUT) at Queen’s Hospital, Romford (QH)
- Barts Health NHS Trust (BH) at the Royal London Hospital, Whitechapel (RLH)
- University College London Hospitals NHS Foundation Trust (UCLH) at the National Hospital for Neurology and Neurosurgery, Bloomsbury (NHNN)

Oncology (radiotherapy and chemotherapy) for brain tumours takes place in the same trust as the neurosurgery at QH. Oncology for brain patients within Barts Health takes place at St Bartholomew’s Hospital in Smithfield (SBH) and for those within UCLH at University College Hospital. Oncology for *London Cancer* brain patients, particularly those who live in the north of the area, also takes place at Mount Vernon Cancer Centre (MVCC), part of East and North Hertfordshire NHS Trust.

Figure 1: Location of *London Cancer’s* brain cancer services

(Shown in blue; red markers are the other hospital sites within *London Cancer*; location of RNOH and MVCC also shown)

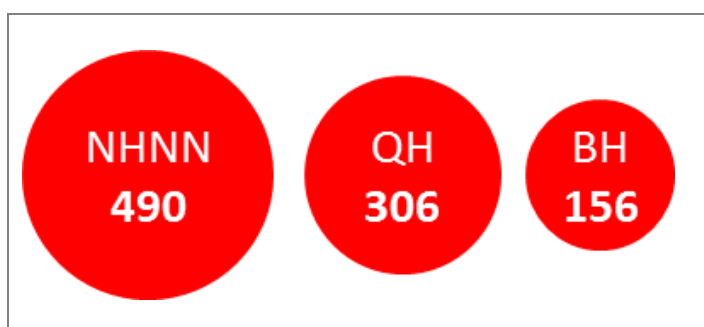


2.3.2 Hospital volumes

How much neurosurgery do we as clinicians do in *London Cancer* each year?

Comparing the number of patients that each of these neuro-oncology surgery services treat in a year is complicated at the moment, by the fact that each of our services records this information in a different way. The best available information for the year 2010/11 is given in figure 2, below. This figure includes all brain and spine tumour patients: malignant and benign. The detailed information that is summarised here is available at the end of the chapter.

Figure 2: The number of patients treated by *London Cancer's* neuro-oncology surgery services, 2010/11



It should be noted that the brain and spine tumour activity at NHNN increased to 633 in 2011/12. Data from this year is unfortunately not available for the other two centres so our records from 2010/11 have been used in the above comparison. This increase in activity at NHNN follows the trend of recent years. This is due, at least in part, to the move of the neuro-oncology surgery service from the Royal Free Hospital in Hampstead to NHNN during this time. The clinicians at Royal Free realised that care for patients needing neuro-oncology treatment in their local areas could best receive this at NHNN, so they worked with colleagues at this centre to redesign the pathway, which has seen many of the clinical staff moving to, or working jointly with, the two hospitals. This has led to increasingly close clinical relationships in this part of the cancer system and more consistent and comprehensive care for our patients.

2.3.3 Other services

In addition to brain cancer treatment being available in *London Cancer*, specialist colleagues are also working in a number of centres providing brain cancer services in the areas neighbouring *London Cancer*. These are listed below, and the numbers show an indication of the size of the centre, as reported by each centre itself for the National Cancer Peer Review process.

- **Charing Cross Hospital** in Hammersmith (250 neuro-oncology surgery patients in 2011/12)
- **King's College Hospital** in Camberwell (500 neuro-oncology surgery patients in 2011/12)
- **St George's Hospital** in Tooting (550 brain tumour surgery patients in 2011/12 and a large number of spinal patients)
- **Addenbrookes Hospital** in Cambridge (600 new tumour referrals in 2011/12)

2.4 Why we need to change

2.4.1 Surgical and hospital volumes – the evidence base

As clinicians we know well that since the 1970s studies have been examining the effect that the number of procedures that surgeons carry out has on the risk of death of the patients that they operate on. One study from 1979 noted that the mortality rates associated with some surgical procedures decreased with increasing number of operations and suggested that the data supported the value of centralisation by region for certain operations¹⁹. Since then the relationship between the number of patients operated on by a surgeon each year ('surgical volumes'), the number of patients operated on at a hospital each year ('hospital volumes'), and the outcomes of operations for the patients has been a rich vein of research.

A study from the late 1990s supported the hypothesis that when complex cancer operations are provided by surgical teams in hospitals with specialty expertise, mortality rates are lower²⁰. A 2000 review of the literature in this area shows that most support a positive volume outcome relationship in initial cancer treatment²¹. It concluded that the literature suggests that, for all forms of cancer, efforts to concentrate its care would be appropriate.

A systematic review from 2002 concluded that high hospital and surgeon volumes are associated with better outcomes across a wide range of procedures, including cancer surgery²². Another review of the literature, this time in 2005, noted that high-volume providers have significantly better outcomes for complex cancer surgery²³.

A US analysis of trends concluded that increasing hospital and surgeon volumes explain much of the decline over time in inpatient mortality for five of the six cancer operations studied²⁴. This study recommended that concentrating cancer resections among high-volume providers should lead to further reduction in inpatient mortality.

A 2008 study, again from the US, revealed large disparities in perioperative mortality between lowest- and highest-volume centres²⁵. It concluded that there were a large number of potentially avoidable deaths each year, if outcomes at low-volume hospitals were improved to the level of highest volume centres. In addition, a recent study on the effect of volume on survival concluded

¹⁹ H S. Luft, J P. Bunker, and A C. Enthoven, Should Operations be Regionalized? The Empirical Relation between Surgical Volume and Mortality, *The New England Journal of Medicine*, 1979;301:1364–1369

²⁰ Begg CB, Cramer LD, Hoskins WJ, Brennan MF, Impact of hospital volume on operative mortality for major cancer surgery, *The Journal of the American Medical Association*, November 25, 1998 – Vol 280, No. 20

²¹ B E. Hillner, T J. Smith, and C E. Desch, *Hospital and Physician Volume or Specialization and Outcomes in Cancer Treatment: Importance in Quality of Cancer Care*, *Journal of Clinical Oncology*, Vol 18, No 11 (June), 2000: pp 2327-2340

²² E A. Halm, C Lee, and M R. Chassin, Is Volume Related to Outcome in Health Care? A Systematic Review and Methodologic Critique of the Literature, *Annals of Internal Medicine*, 2002;137:511-520

²³ S.D. Killeen, M. J.O'Sullivan, J. C. Coffey, W.O. Kirwan and H. P. Redmond, Provider volume and outcomes for oncological procedures, *British Journal of Surgery* 2005; 92: 389–402

²⁴ V Ho, M J. Heslin, H Yun, and L Howard, Trends in Hospital and Surgeon Volume and Operative Mortality for Cancer Surgery, *Annals of Surgical Oncology*, 13(6): 851-858

²⁵ K Y. Bilimoria, D J. Bentrem, J M. Feinglass, A K. Stewart, D P. Winchester, M S. Talamonti, and C Y. Ko, Directing Surgical Quality Improvement Initiatives: Comparison of Perioperative Mortality and Long-Term Survival for Cancer Surgery, *Journal of Clinical Oncology* 26:4626-4633, 2008

that, after adjusting for differences in the case mix, cancer patients treated by low-volume surgeons in low-volume hospitals had poorer 5-year survival rates²⁶.

As clinicians treating cancer, we need to take note of this evidence base, and what this means for our patients. We also know from our own perspective, that teams who work together regularly in one place, treating the same conditions all the time, become very skilled in doing so and make better decisions for patients, particularly those with the most complex or very rare conditions.

2.4.2 National perspective

In the UK, the National Institute for Health and Clinical Excellence (NICE) published its guidance *Improving Outcomes for People with Brain and Other CNS (central nervous system) Tumours* in 2006²⁷. These guidelines are well known to our clinical colleagues across *London Cancer*.

The NICE guidance acknowledges that, because these cancers require specialist neurosurgery and oncology services, specialist multidisciplinary teams should be based in neuroscience and cancer centres. The guidance sets out a model of a neurosciences specialist multidisciplinary team, centred on neurosurgery, and a 'cancer network' multidisciplinary team that deals with the subsequent oncological aspects of treatment pathways.

The improving outcomes guidance notes observational evidence that suggests that, as in the case in other cancer types, there is a positive relationship between the volume of patients that a centre treats and the perioperative outcome of patients following neurosurgery²⁸. The guidance also notes the observational evidence for subspecialisation in neurosurgery²⁹. It states therefore that brain tumours should be managed by neurosurgeons that spend at least 50% of their programmed activities for surgery undertaking neuro-oncological surgery and are regularly involved in dedicated specialty clinics caring for these patients. This recommendation has been very hard to achieve for many neuro-oncology providers, as it has implications for the surgical workforce and ways of working, but we recognise its aims to ensure the very best care for patients, and *London Cancer* aspires to making this a reality.

As we know that specialist follow-up care and support are essential to patient experience and quality of life being maximised, we support that the NICE guidance also recommends that patients should have access to specialist neuro-rehabilitation services as and when appropriate, and that every region should have an allied health professional (e.g. physiotherapist, occupational therapist, etc.) who has overall responsibility for co-ordinating the provision of rehabilitation services, education, training and research.

The key themes of the NICE guidance (including size of neuro-oncology surgery centres and neuro-surgical subspecialisation) are picked up and reiterated in NHS England's *Service specification for brain/central nervous system tumours*³⁰. From 2013/14, providers of care for brain tumours will be expected to comply with this nationwide commissioning service specification. The changes proposed

²⁶ C-M Chang, K-Y Huang, T-W Hsu, Y-C Su, W-Z Yang, T-C Chen, P Chou, C-C Lee, Multivariate Analyses to Assess the Effects of Surgeon and Hospital Volume on Cancer Survival Rates: A Nationwide Population-Based Study in Taiwan, *PLoS ONE* July 2012, Volume 7, Issue 7, e40590

²⁷ National Institute for Health and Clinical Excellence, *Improving Outcomes for People with Brain and other CNS Tumours: The Manual*, 2006

²⁸ See National Institute for Health and Clinical Excellence, *Improving Outcomes for People with Brain and Other CNS Tumours: The Evidence Review*, 2006

²⁹ Ibid.

³⁰ NHS England, *Service specification for brain/central nervous system tumours*, 2013

here by *London Cancer* support or exceed all of these ambitions, and would help clinicians achieve stretching standards of national best practice.

2.4.3 London perspective

As outlined in section 1, the NHS body responsible for the whole of London in 2009/10 reviewed cancer services in the capital at the time and developed the *Model of Care* for cancer services. The review showed that access to and outcomes from cancer care were unequal across the city and that mortality rates from cancer were higher in London than the rest of the UK. The review included an engagement process with key stakeholders and patient groups from across London and made a compelling argument for the need to improve cancer services in London.

Many of us, as local specialists in the disease, contributed to the clinical case for change, and the review noted that nationally brain and central nervous system services support populations significantly larger than those served by some of the London neuro-oncology surgery centres. **We recommended that the number of services in London be reduced to four**, serving catchment populations of at least 2 million, with oncology services located on these sites and strong links with local acute hospitals for referral.

We also noted the need to increase the proportion of patients operated on by neurosurgeons with a specialist interest in tumours and envisaged that this would require a reorganisation of surgical teams, which was likely to be challenging for services managing smaller populations.

The London-wide review of cancer services made a number of recommendations which we fully endorse:

- There should be two centres in London for base of skull and pituitary tumours, co-located in centres with neurosurgery and two of the five specialist head and neck services that it also advocated
- London should have two spinal cord specialist multidisciplinary teams and these should also be co-located with base of skull and pituitary
- There should be neuro-psychology expertise at neuroscience centres
- Neuro-rehabilitation services and dedicated beds should be collocated with neuroscience centres and offer rapid access to appropriate levels of neuro-rehabilitation closer to home.

Again, these themes were picked up on and reiterated in the *Best practice commissioning pathway* published by NHS London in early 2013³¹. The intention is that this pathway will form the basis of commissioning for brain tumours in 2013/14.

2.4.4 Local perspective

We, the clinical experts of the *London Cancer* Brain and Spine Pathway Board, have been meeting regularly since April 2012. Our work since then has been informed by the national and local guidance and our vision to improve and strive for excellence have revealed areas where improvements could be made across the pathway. Considerable variation has been found in services for patients with brain tumours in *London Cancer*. Variation needs to be understood and justified. Areas of variation between and within neuro-oncology surgery services include:

- The performance of neuropathology services identified in local audit
- The time dedicated to neuro-oncology surgery by different surgeons

³¹ NHS London, *Best Practice Commissioning Pathway: Brain and central nervous system pathway 2013/14*

- The time that patients wait to have radiotherapy after surgery
- The access that patients have to the support of a clinical nurse specialist
- The access that patients have to neuro-rehabilitation services
- The functioning of the 'cancer network' MDT.

Since 2011, the neuro-oncology service at NHNN/UCLH has enlarged considerably even allowing for the move of neurosurgical oncology and skull base services from the Royal Free Hospital. There are 4 established sub-specialised MDTs, with all pituitary and specialised skull base surgeries within *London Cancer* already taking place at NHNN. Skull base services from Barts Health have already moved over to NHNN. As a result, NHNN has the largest skull base neuro-oncology and pituitary service in the UK.

NHNN and the UCL Institute of Neurology (IoN) provide an unrivalled critical mass of clinical and research excellence that spans the entire translational pipeline from world class discovery neuroscience to high quality patient care and outcomes. Over the next 20 years, the Hospital's and the Institute's aim to deliver ambitious clinical and research strategies would drive the translation of excellent science allowing the treatment of more adult and adolescent patients than ever before. Currently over 130,000 neurological patients are assessed and treated each year at NHNN and over 10,000 neurosurgical operations are performed. It employs 1,500 staff and it is the largest adult neuroscience hospital in the UK.

As a national centre of excellence, the NHNN receives referrals from all over the country. Over the last three years there has been a significant expansion of the brain tumour service with the amalgamation between the existing NHNN/UCLH service and the Royal Free neuro-oncology MDT.

We believe NHNN could extend this world-class service for the whole North and East London.

Neuropathology

An audit of neuropathology services across the three neuro-oncology surgery centres within *London Cancer* has been carried out. The audit looked at indicators such as:

- Neuropathologist availability
- Capacity for intraoperative assessment
- Proportion of surgical specimens reported within 7 calendar days
- Neuropathologist presence at MDT meeting

The audit showed that NHNN and QH were largely as good as we would want them to be, meeting all of the quality indicators. It revealed however that the neuropathology services at the Royal London were performing significantly poorer than the other two centres in a number of key areas. We feel this needs to change.

Neuropathology services must all meet and/or exceed established quality indicators.

Neurosurgery

To varying degrees all three centres currently have neurosurgeons managing brain tumours where this does not form 50% of their clinical activities.

QH has plans in place to move to a position where all neurosurgeons undertaking neurosurgery on brain tumour patients spend 50% of their time doing so. Our neurosurgical leaders believe in making this change happen.

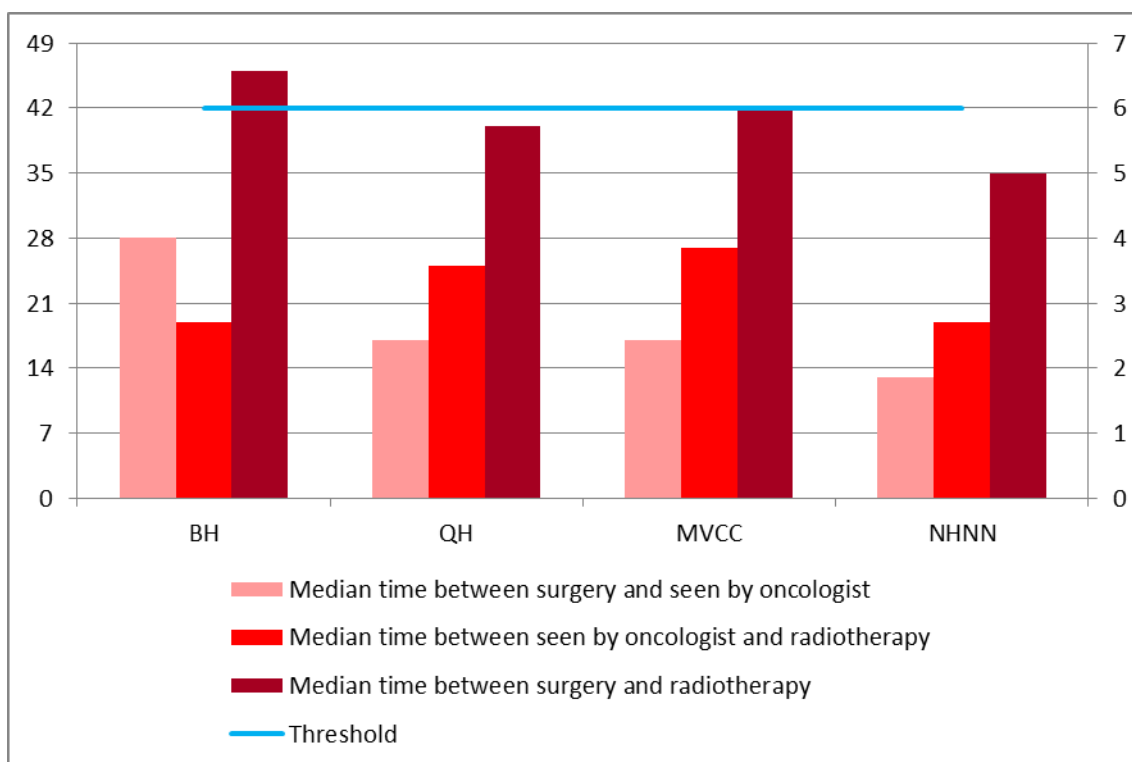
Patients would benefit from more dedicated neurosurgical time.

Radiotherapy

There is evidence that radiotherapy for high-grade glioma should take place as soon as possible and always within six weeks³². An audit to understand the current waiting times for these patients in *London Cancer* (including those undergoing surgery at NHNN but radiotherapy at MVCC) revealed considerable variation between centres. One service, Barts Health, had a median time between surgery and radiotherapy of over six weeks for this period. This is not acceptable going forward for our patients, and needs to change.

Patients need and deserve better and faster access to radiotherapy.

Figure 3: Preliminary results of the *London Cancer* time from neurosurgery to radiotherapy audit, high-grade glioma patients, median waiting times, January to June 2012



Many brain tumours, particular benign brain cancer as well as metastasis, would benefit from advanced radiotherapy techniques. UCLH has been selected as one of two centres in the country to house proton beam facilities, which would avoid selected patients having to travel abroad for their treatment.

³² Irwin et al., Delay in radiotherapy shortens survival in patients with high grade glioma, *Journal of Neuro-onc* 85, 3 (2007), 339-343;
Blumenthal et al., Short delay in initiation of radiotherapy may not affect outcome of patients with Glioblastoma: A secondary analysis from the RTOG database, *J Clin Oncol*. 2009 February 10; 27(5): 733-739
Rose et al., The timing of cranial radiation in elderly patients with newly diagnosed glioblastoma multiforme, *Neuro Oncol* (2010) 12 (2): 190-198

Clinical nurse specialists

We know from a large body of evidence, that the support and information provided by Clinical Nurse Specialists for people with cancer is fundamental to the outcomes of their care. Not only do CNSs deliver vital aspects of clinical care, but the holistic needs they address and the coordinating role they fulfil is hugely influential in patient experience and quality of services.

At the moment, we are letting our patients down in this area. There is wide variation in the clinical nurse specialist capacity across *London Cancer*. NHNN has a number of clinical nurse specialists but is currently experiencing difficulties in recruiting to vacant posts. QH has until recently had a single, whole time nurse specialist covering the entire service. The BH service has experienced difficulty with clinical nurse specialist capacity. The service went for a number of months in 2012/13 with no nurse specialist, but has recently appointed an individual to cover the service part-time. This has meant that there may be no cover for the occasions on which clinical nurse specialists have planned or unplanned absence.

We must prioritise changing our pathway to give patients more and better support from dedicated Clinical Nurse Specialists.

Neuro-rehabilitation

Maximising the chances of an improved quality of life and minimising the side-effects of treatment depends on good access to neuro-rehabilitation services for brain tumour patients. Not only is this widely known amongst us as a clinical body, it is a key principle of the NICE *Improving outcomes* guidance. The provision of these services remains a national problem. An exercise to understand the neuro-rehabilitation services currently available in *London Cancer* has shown great variability in the services, skills and equipment that brain tumour patients can draw upon.

Specialist neuro-rehabilitation should be available to all patients who would benefit.

Access to clinical trials

NHNN/UCLH is well supported by the National Institute of Health Research / Wellcome UCLH Clinical Research Facility, which has state-of-the-art facility dedicated to experimental medicine. The research facility has a strong portfolio of early phase brain cancer clinical trials, including development of biomarkers and targets for therapy in brain cancer. This close relationship with research has enabled NHNN/UCLH to take part and lead multiple studies for brain cancer.

Patients need and deserve better access to clinical trials.

2.5 What we need to do

We, as a collaborative of brain cancer clinical experts, are clear that brain cancer services need to change for the better. Both local and national-level commissioning documents have been published in 2013 and set out how the expectations of national and local commissioners agree. While they are comprehensive, we feel that we need to work out together how locally we would make these improvements and sustain them for patients in years to come.

As such, we clinicians involved in the *London Cancer* brain cancer pathway have defined a clear vision of how services should be delivered in the future to ensure the best possible outcomes and experience for patients.

The *London Cancer* Brain and Spine Pathway Board, a multi-professional group of doctors, nurses and allied professions with GP and patient representation, has therefore developed our *pathway specification*³³. The various commissioning documents have been taken as a strong guide in its development and there is acknowledgement that these have been worked up with considerable clinical engagement. It is also acknowledged that the national documents have been developed to be applicable to a wide variety of local contexts, from sparsely populated rural to regions to large metropolitan areas. The Pathway Board has therefore not been bounded by them where there is an evidence base to do otherwise, and aimed to exceed the minimum requirements, considering how well we know the needs of local patients.

2.5.1 How would things be different if we change? – Local cancer units, GPs, community care and hospices

We know that the vast majority of suspected brain tumours will continue to be admitted to hospital as an emergency rather than referred by their GP. All local hospitals will ensure an immediate referral will be made to a neuro-oncology surgery centre when a suspected brain tumour patient is identified. These referrals will include clinical information, the original CT scan, and the named point of contact at the referring unit. The investigations for suspected brain tumours at local cancer units should be carried out to the agreed *London Cancer* protocols to avoid the need for repeat imaging wherever possible.

GPs will occasionally see patients in whom they suspect a brain tumour, and it is expected that they would use the appropriate NICE referral guidance and the agreed *London Cancer* forms in considering an urgent referral. Hospital teams would work with GP colleagues to help them improve the urgent referrals that they make.

At the other end of the patient pathway, our neuro-oncology surgery centres would work in partnership with oncology centres, local cancer units, GPs and hospices to implement new models of long-term follow-up and therefore to limit the amount of follow-up at the centre. GPs and hospices would keep the neuro-oncology surgery centre updated with the care that a patient receives in the community and any changes in their circumstances.

2.5.2 How would things be different if we change? – Specialist neuro-oncology surgery centres

The current configuration of three neuro-oncology surgery centres for brain tumour patients does not provide the high standard of service that is expected or required.

The London-wide review of cancer services recommended four providers of specialist brain cancer services for London, each serving a population of at least 2 million. Applying these recommendations to *London Cancer* leaves a configuration of either one or two specialist centres. We have a resident population of 3.5 million, but one of our current centres primarily serves the Essex population as well as some of those in outer London.

Given we support the evidence that larger services have better outcomes, local clinicians propose that there would be two specialist neuro-oncology surgery centres in the *London Cancer* region.

One neuro-oncology surgery centre would cover the population of outer London and Essex. Queen's Hospital in Romford is the regional neuroscience centre for Essex and could therefore very likely to continue to be the neuro-oncology surgery centre for outer London. The other centre would cover a

³³ London Cancer, *Pathway specification for brain and spine cancer*, 2013

London Cancer population of in excess of 2 million and would be one of the two existing inner London centres. The current neuro-oncology surgery centre that ceases to carry out surgery may continue to provide oncology services to ensure that these are available as close to patients' homes as possible, working closely with the neuro-oncology surgical units to ensure patients are supported in all aspects of treatment.

London Cancer's two neuro-oncology surgery centres would deliver the detail of the brain pathway specification that we have developed through the *London Cancer* Brain and Spine Pathway Board. They would serve large populations and have the critical mass to address the limitations observed in current services. Every brain tumour patient would have access to:

- a clinical nurse specialist,
- neuro-pathology services would operate to the required standards,
- neurosurgeons undertaking neuro-oncology surgery would do so for a significant proportion of their time
- Radiotherapy would take place in a timely fashion after surgery.

As a clinical community we would make sure that the neuro-oncology surgery centres work closely with local cancer units and oncology centres in *London Cancer*, and the areas neighbouring it, to ensure that patients have as much of their treatment and follow-up care as close to home as possible. Aligned with the principles of NICE guidance, *London Cancer's* neuro-oncology surgery centres would each have a 'cancer supportive care' MDT. Once our patients finish the neurosurgical part of the pathway then they would continue to be managed by a cancer supportive care MDT at the centre or in a neighbouring centre.

A configuration of two highly specialist and comprehensive neuro-oncology surgical centres is our vision for brain tumour services in *London Cancer*. As this would require services to be relocated and additional resources to be put in place, there would be a substantial transition phase in its implementation, we anticipate over a number of years. By our commitment to working in partnership towards this shared goal, we as the specialist clinicians and providers of brain tumour services in *London Cancer* would work together to maintain services with the highest standards of care.

2.6 The *London Cancer* Board recommendation to commissioners for Brain Cancer

The *London Cancer* Board received applications from BHURT and UCLH to provide specialist neuro-oncology surgery centres and considered these on 7 August 2013. Barts Health chose not to make a submission but to support the application from UCLH to develop a single, high volume surgical centre at the NHNN from the two existing central London services. The Board recognised that both BHRUT and UCLH (NHNN) provide neurosurgical oncology services of high clinical quality. The Board concluded that it was satisfied to recommend to commissioners that the centre for the *London Cancer* population should be based at UCLH (NHNN), based on the following considerations:

- Current case numbers that support the full range of sub-specialist services, including pituitary and base of skull tumours, and include national referrals
- The size of its existing dedicated facilities
- The ease of compliance with current and anticipated national standards

2.7 The expected benefits for patients

We are excited by the opportunity of making care of brain cancer much better for our population. The expected benefits of the proposals can be summarised as:

- A critical mass of brain cancer patients would mean that our surgeons carry out enough operations each year to continuously improve, deliver better outcomes for patients and that support services perform well and are sustainable
- We as surgeons would have access to the most up-to-date equipment and are supported by an expert team containing all of the right types of highly-skilled staff
- We would be able to provide services which are more productive and efficient through the minimisation of duplication and waste
- We could have greater confidence in the ongoing excellence of our services, as we would be able to better attract national and international clinical staff to work in the specialty and offer higher quality clinical training to junior doctors and other health professionals
- Concentrating services into two centres would also make it easier to carry out research, biobanking and clinical trials which are essential for finding the next treatments and therapies that help to beat brain cancer

2.8 The impact on patients

The clinical pathway that our patients with brain tumours follow would not be changed by these proposals. Presently patients with suspected brain tumours have specialist investigations are diagnosed and treated at one of three neuro-oncology surgery centres. These centres vary in their set up, infrastructure and performance. In the future they would follow the same clinical pathway but into one of two centres that provide services to a high quality and without the limitations of the current arrangements.

2.9 Appendix – patient numbers

Barking, Havering & Redbridge Hospitals NHS Trust

Number of patients cared for by the BHRUT neurosurgeons on the surgical ward, 2010/11

Astrocytoma Gd1&2	9
Astrocytoma Gd3	2
Glioblastoma Gd4	82
Cranial/spinal nerve tumour	14
Ependymoma	10
Haemopoetic	17
Meningioma	61
Metastasis	28
Non Op	13
Non Tumour	15
Oligodendroglioma	11
Other	18
Pituitary	26
Total	306

University College London Hospitals NHS Foundation Trust

Number of tumours seen at NHNN, by tumour type, 2010 to 2012 (updated figures from those published in Peer Review reports)

	2010	2011	2012	
Brain Cancer				
High-grade gliomas	Gd III	19	37	46
	Gd IV (GBM)	57	89	132
Metastases	53	74	100	
Total	129	200	278	
Low-grade/benign tumours				
Low-grade gliomas	20	30	33	
Ependymomas	6	8	14	
Meningiomas	79	98	130	
Pituitary tumours	111	116	116	
Schwannoma	27	38	62	
Total	243	290	355	
Overall total	372	490	633	

Barts Health NHS Trust

Number of brain and spine tumour patients diagnosed at RLH, 2010/11

Neoplasm of the Brain	94
Neoplasm of the Meninges	3
Neoplasm of the Spinal cord	3
Neoplasm of Endocrine glands and related structures	7
Neoplasm of other or ill-defined sites (including skull base)	49
Total	156

3 Urology

3.1 Summary

Across North East and North Central London and West Essex – a population of 3.2 million –around two people a day require complex surgery to treat kidney, bladder or prostate cancer³⁴. These patients require specialist, once-in-a-lifetime surgery to give them the best chance of controlling their cancer and reducing the risk of long-term side effects.

In the *London Cancer* region, there is a highly-skilled and experienced workforce, passionate and committed to delivering the best care to the populations that it serves. However, the way in which services are currently arranged does not maximise the delivery of the highest quality of care, research and training that our hospitals are capable of.

London Cancer's clinicians want to change this. Urological cancers should be diagnosed earlier, whilst also improving the care and support of people who have finished their treatment, either living with their cancer, in remission or recovery. The way in which hospital care is organised also needs to change. National and international evidence demonstrates a clear link between higher surgical volumes and better patient outcomes.

Specialist radiotherapy and complex chemotherapy are already concentrated in a small number of specialist centres. *London Cancer's* clinicians believe that the same should be true of specialist surgery for kidney, bladder and prostate cancers.

Our clinicians believe that the creation of single specialist centres and high quality local units would provide our patients with high quality diagnostic and therapeutic care and expand opportunities to develop research that benefits patients. This would put our services in a position to be among the best in the world – both in the quality of care and the opportunities for patients to take part in research and access new treatments. *London Cancer* aims to make changes that would be durable for a generation to create a platform that can support future innovation.

Specialist treatment is only a small part of a urological cancer patient's care. The vast majority of patient care would always take place at local hospital units and GP surgeries.

Patient feedback shows that where they are cared for in different hospitals, they want their care to be joined up and to the same high standards wherever they are. Clinicians in *London Cancer* understand this and are committed to making it happen.

This section makes the case for changing urological cancer services across North East and North Central London and West Essex and describes how *London Cancer* believes it can radically improve patient outcomes and patients' experience of care.

³⁴ 2010/11 complex surgery for kidney, bladder and prostate cancers

3.2 Background

3.2.1 *London Cancer*

These proposals have been developed by the *London Cancer* Urology Pathway Board. Representatives of all of the NHS trusts within *London Cancer* that provide urological cancer services were therefore involved in their development:

- Barnet and Chase Farm Hospitals NHS Trust
- Barts Health NHS Trust
- Barking, Havering and Redbridge University Hospitals NHS Trust
- Homerton University Hospital NHS Foundation Trust
- North Middlesex University Hospital NHS Trust
- Princess Alexandra Hospital NHS Trust
- Royal Free London NHS Foundation Trust
- University College London Hospitals NHS Foundation Trust
- Whittington Health NHS Trust.

3.2.2 *Bladder cancer*

Around 400 cases of bladder cancer are diagnosed each year in our area. Bladder cancer becomes more common as people get older and is more common in men than in women. The symptoms of bladder cancer are blood in the urine and changes in urination. These are also the symptoms of a lot of other less serious diseases.

Eight out of 10 patients diagnosed have early bladder cancer. These early cancers are often limited in size and the degree to which they have spread. They can therefore be treated by relatively simple surgery that can take place in most hospitals.

A much smaller number of bladder cancers, less than 100 per annum, are more advanced and have spread further (metastasised). These often need to be treated with a combination of complex major surgery, radiotherapy and chemotherapy.

3.2.3 *Prostate cancer*

Prostate cancer is the most common cancer found in men – around 1,500 cases of prostate cancer are diagnosed locally each year. However, very complex surgery is only required by a small number of people. In 2010/11, 220 complex operations for prostate cancer took place across the *London Cancer* area.

Prostate cancer differs from most other cancers in that small areas of cancer in the prostate are very common and may stay inactive for many years. Prostate cancer can cause changes in urination, but these symptoms are often subtle when compared to the same symptoms caused by the less serious changes to the prostate gland seen in all men as they get older.

There are many different treatment types and each have different benefits and different side effects. Treatment options include monitoring the cancer (known as active surveillance), treatment with radiotherapy or brachytherapy³⁵, hormone therapy or surgery. We know that sometimes a

³⁵ See glossary at the end of this document (Section 8.2).

patient's treatment decision can be influenced by the facilities available at different hospitals and the approaches favoured by different teams.

Patients with any new diagnosis of cancer need to be given clear information and unbiased support in making the difficult decision on what course to follow. Due to the range of treatment options, this is particularly important for prostate cancer patients. If initial treatment fails or if the cancer spreads then treatment focuses on hormone therapy and chemotherapy. These patients should be able to discuss treatment options, impact of treatments and clinical trials of new drugs.

3.2.4 Kidney cancer

Kidney cancer is relatively rare and is approximately twice as common in men as in women. Around 400 new cases of kidney cancer are diagnosed each year across north east and north central London and west Essex.

Kidney cancer is most commonly found incidentally while scanning patients for something else. It may also be picked up in outpatient clinics for people with the symptom of blood in their urine. There are relatively few treatment choices for kidney cancer and treatment is most often surgical.

Some surgical operations for kidney cancer are simple whereas others are very complex. All are becoming increasingly reliant on emerging technologies, such as keyhole (laparoscopic) surgery and robotically-assisted surgery. Surgery should seek to save as much of the kidney as possible. A number of non-surgical treatment options also seek to do this.

If kidney cancer spreads then the aim of treatment is to control the cancer through new targeted therapies. This often happens within clinical trials.

3.2.5 Other urological cancers

While other urological cancers such as penis and testicular cancers are not the focus of this case for change, there are some co-dependencies which we need to consider. For instance, a highly-specialised operation to treat widespread testicular cancer following chemotherapy is carried out by kidney cancer surgeons, so we would take this into account when proposing changes to kidney cancer services.

3.3 Current services

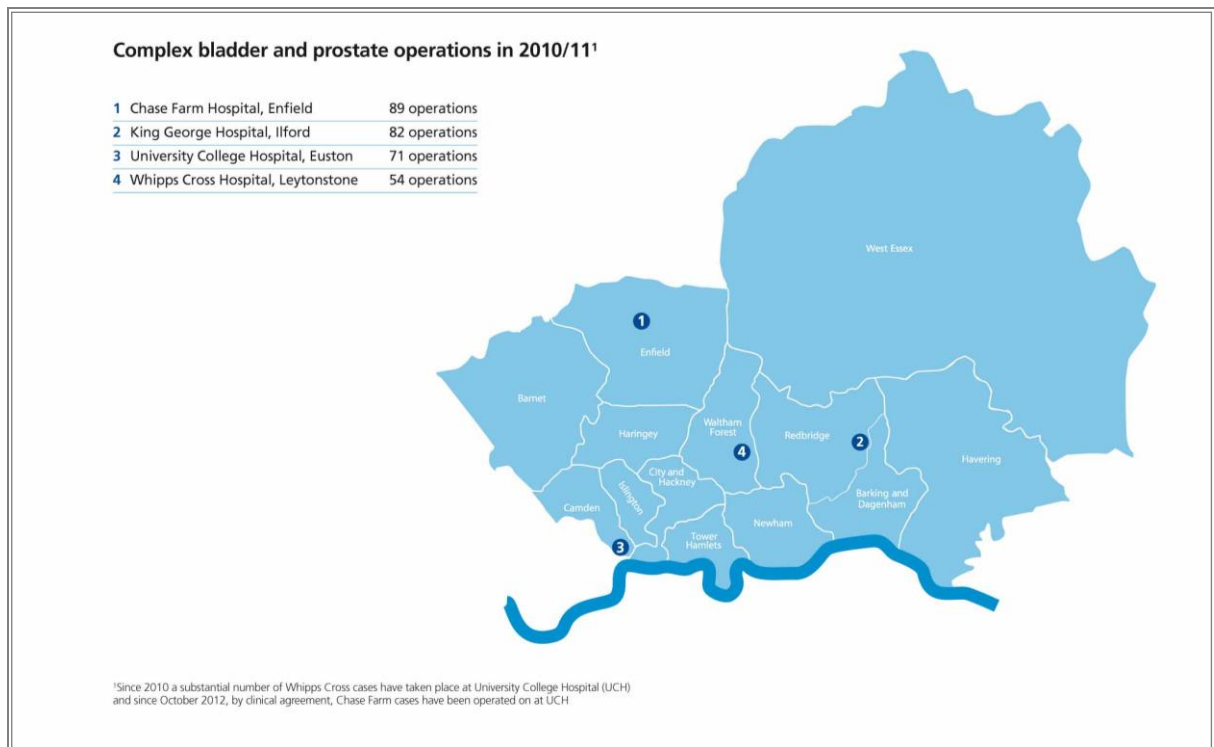
3.3.1 Hospital volumes – Bladder and prostate cancer

Of around 1,900 cases of all prostate and bladder cancers diagnosed in *London Cancer* each year, only 350 patients require complex surgery. This is just under 1 in 5 of all patients (18%).

There are currently four bladder and prostate cancer surgical centres across North East and North Central London and West Essex³⁶. Each centre serves a population of between 600,000 and 1 million.

³⁶ Since 2010, a substantial number of Whipps Cross cases have taken place at University College Hospital. Since October 2012, by clinical agreement, a temporary arrangement has been in place for Chase Farm patients to be operated on at University College London Hospital in response to an internal audit which demonstrated that optimal outcomes were not being achieved for some patients. This arrangement is not part of the review of urological cancer specialist services being led by *London Cancer*, but is a temporary local arrangement in response to clinical need.

There are also a number of patients from other parts of London and south Hertfordshire who choose to have their complex pelvic procedure (to treat bladder and prostate cancer) at one of the *London Cancer* hospitals providing urological surgery.



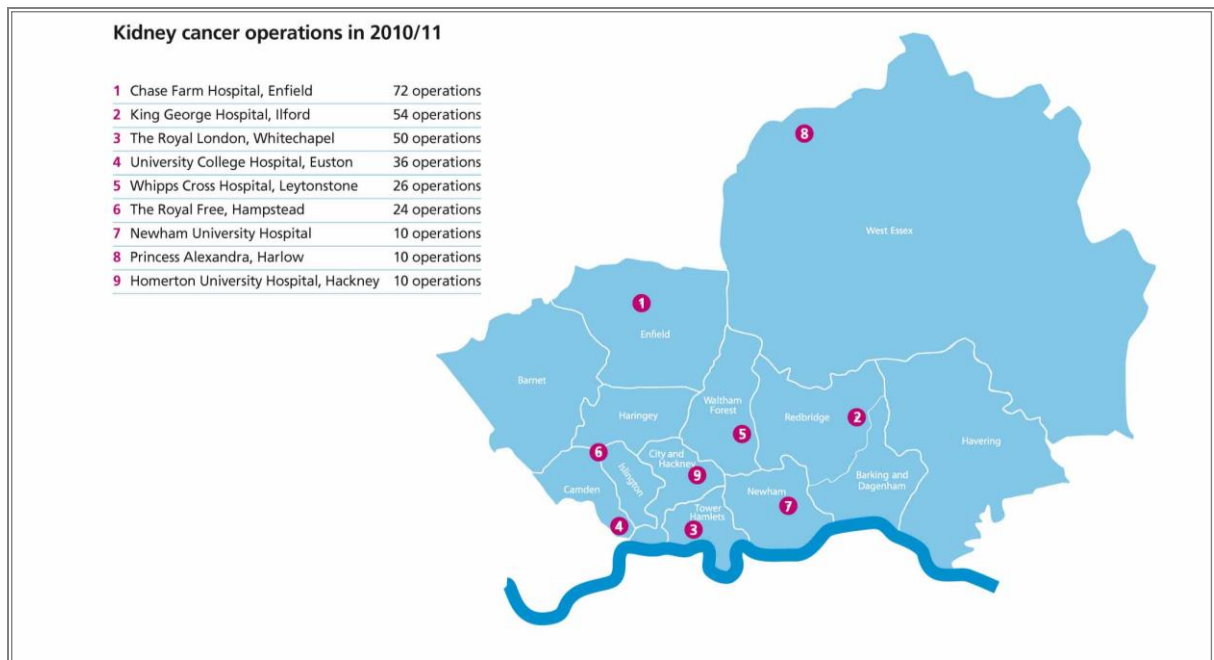
In 2010/11, each surgical centre carried out between 54 and 89 complex operations – a total of 296. This total was made up of 220 operations for prostate cancer and 76 operations for bladder cancer.

We also estimated that there are up to 50 bladder and prostate patients each year who do not get the complex surgery that they would benefit from because they are not having all of the possible treatment options discussed with them. Our challenge is to ensure that everyone who needs specialist surgery should have access to the appropriate surgery.

3.3.2 Hospital volumes – Kidney cancer

Of around 400 new cases of kidney cancer diagnosed in *London Cancer* each year, 300 (75%) require surgery.

Across North East and North Central London and West Essex, complex kidney cancer surgery is provided in all nine hospitals that treat and care for adult urological cancer patients. In 2010/11, they each did between 10 and 72 operations – a total of 292 operations.



3.3.3 Other services

There are a number of centres undertaking urological surgery in the areas neighbouring *London Cancer*:

- Imperial College Hospitals, both **Charing Cross Hospital** in Hammersmith and **St Mary's Hospital** in Paddington (jointly 60 cystectomies and 175 radical prostatectomies in 2011/12)
- **Guy's Hospital** at London Bridge (200 radical prostatectomies and 50 cystectomies in 2011/12)
- The **Royal Marsden Hospital** in Chelsea (380 radical prostatectomies and 100 cystectomies in 2011/12)
- The **Lister Hospital** in Stevenage, Hertfordshire (126 radical prostatectomies, 36 radical cystectomies in 2011/12)
- **Southend Hospital** in Essex (80 radical prostatectomies and 80 cystectomies in 2011/12)
- **Addenbrookes Hospital** in Cambridge (80 cystectomies and 170 radical prostatectomies in 2011/12)

3.4 Why we need to change

3.4.1 Surgical and hospital volumes

As detailed already in this Case for Change, since the 1970s, a large body of clinical evidence has shown that larger volume surgical centres have the best outcomes for many types of cancer surgery, and the same is true of surgeons who undertake higher numbers of procedures.

In addition to this generic evidence for a relationship between surgical and hospital volumes, there is also an overwhelming weight of evidence specific to urological cancers³⁷.

3.4.2 National perspective

Whilst there have been significant improvements in cancer care in the UK over the past decade, there is further improvement needed to deliver world-class cancer services. While deaths from cancer have fallen, the UK still has a relatively high mortality rate.

National and international evidence demonstrates a clear link between higher surgical volumes and better patient outcomes. Specialist centres which have frequently practising specialist teams and full facilities, with high patient throughput, generally have better patient outcomes.

In 2002, the National Institute for Health and Clinical Excellence (NICE) published guidance on improving services for urological cancers³⁸ which recommended that patients with cancers that are less common or need complex treatment should be managed by specialist multidisciplinary teams in large hospitals or cancer centres.

3.4.3 London perspective

“[A] number of London hospitals [are] seeing a low volume of bladder and prostate cancer patients. [It] is clear that Londoners are not currently being provided the world-class service they deserve.”

London-wide review of cancer services, 2009/10

As outlined in section 1, the NHS body responsible for the whole of London in 2009/10 reviewed cancer services in the capital at the time and developed the *Model of Care* for cancer services. The review showed that access to and outcomes from cancer care were unequal across the city and that mortality rates from cancer were higher in London than the rest of the UK. The review included an engagement process with key stakeholders and patient groups from across London and made a compelling argument for the need to improve cancer services in London.

The London-wide review showed that there was evidence that specialist hospitals and surgeons that treat more urological cancer patients achieve better outcomes for high risk surgical procedures and recommended that minimum thresholds for surgery be set.

This London-wide review made wide ranging proposals for increasing early diagnosis, improving hospital care and taking a new approach to patients living with cancer. The proposals said that common treatments should be available locally to patients, but that specialist surgery should be concentrated into fewer, high volume, expert teams.

³⁷ See appendix in Section 3.9

³⁸ National Institute for Clinical Excellence, Improving Outcomes in Urological Cancers: The Manual, 2002

For bladder and prostate cancer this ambition led to three specific surgical recommendations:

- That a maximum of five hospitals across the whole of London should provide complex bladder and prostate surgery³⁹
- That each surgical centre should serve a population of at least two million
- That these centres should carry out a minimum of 100 operations for complex bladder and prostate cancer a year.

For kidney cancer, the clinical papers that form the London guidance concluded that the management of renal malignancies should be confined to specialist urology multi-disciplinary teams.

3.4.4 Local perspective

There is clear evidence that surgeons performing high volumes of surgery have better patient outcomes. A large amount of this evidence is in urological cancers and this is outlined in national guidance and in the London-wide review of cancer services.

While there has been some concentration of services, *London Cancer* still has a number of hospitals seeing relatively small volumes of patients for specialist urological cancer surgery when compared with other centres.

Clinicians across North East London, North Central London and West Essex believe a more ambitious approach is required to deliver the world-class services that our populations deserve. Therefore, we believe that consolidating complex surgery in fewer specialist centres would provide the best outcomes for our patients.

3.5 What we need to do

There is a clear need for us, as the clinicians involved in the *London Cancer* urological cancer pathway, to agree a clear statement on how services should be delivered in the future to ensure the best possible outcomes and experience for our patients.

The *London Cancer* Urology Pathway Board, which is made up of multi-professional clinicians from all hospitals trusts as well as GP and patient representation, has therefore developed a *pathway specification*⁴⁰.

3.5.1 How would things be different if we change? – Earlier diagnosis and better support

We need to work with our colleagues in the NHS and outside to diagnose urological cancers earlier. Earlier diagnosis of bladder and prostate cancer would help to improve survival rates and access to care.

We would test innovative ideas, like giving GPs access to one-stop clinics for people with blood in their urine, so they can receive a definitive diagnosis more quickly. We would also seek

³⁹ At the time there were more than 10 bladder and prostate centres across London, four in the London Cancer area.

⁴⁰ London Cancer, *Pathway specification for urological cancer*, 2013

opportunities to work with our medical colleagues outside of cancer care on joint screening programmes to help us find cancer and other serious health problems earlier.

We need to provide better information to patients and carers to help them make decisions about their treatment options. This is particularly important for prostate cancer for which there are a range of treatment options.

During and after treatment we need to make sure that people are offered support, care and rehabilitation that is appropriate and convenient to them and is delivered as close to their homes as possible.

3.5.2 How would things be different if we change? – Specialist services

Currently, our hospitals services are not organised to deliver the best possible outcomes for patients. The London-wide review of cancer services recommended five providers of specialist bladder and prostate cancer surgery for London, each serving a population of at least 2 million. The London-wide review does not make clear recommendations on renal cancer but as a group of clinicians we believe that the same principles should apply to renal cancer.

Applying these recommendations to *London Cancer* leaves a configuration of either one or two specialist centres. With a population of 3.2 million, a configuration of two centres would not meet the requirement for each centre to serve 2 million.

Our proposal is therefore to provide complex surgery for bladder and prostate cancer in one specialist centre and complex surgery for kidney cancer in one specialist centre.

3.5.3 Why single specialist centres?

Currently many hospitals are undertaking small amounts of surgery. There is overwhelming international evidence that for complex procedures, such as major cancer surgery, a higher volume of patients results in fewer complications, shorter lengths of stay and better outcomes for patients. Research shows that as volumes of patients increase, outcomes for patients improve. This means that the more patients treated, the better the outcomes for patients.⁴¹

A large team is required to deliver surgical excellence. A single specialist centre would make it easier to ensure that patients receive care from health professionals with specialist expertise. This is because we could more easily sustain a critical mass of health professionals with specialist expertise to look after patients during and after their surgery and to have joint appointments with or rotate through local hospitals. A single surgical centre would have the volumes to invest in skills, technology and research, maximising the use of the most advanced techniques and facilities, such as robotics.

For complex procedures, training of specialist nurses, surgeons and fellows is more likely to be achieved through one large centre. A world class centre would also attract the most talented staff, increasing the skill of the team, and be more visible to industry partners and international expert peers to attract investment and research grants. These staff would bring their expertise to patients at every step of their pathway, as they would be part of the combined multi-disciplinary teams at the specialist centre and local units.

⁴¹ Specialist Urological Cancer Centres – the Clinical Evidence. See Appendix 2.

A single specialist centre would make it easier and more affordable to support the routine use of molecular pathology in diagnosis and tissue banking to support research. It would also help to co-ordinate access to clinical trials.

3.5.4 How the single specialist centres would work

These centres would be part of a well-defined pathway that begins with all patients being diagnosed and assessed at their local hospital by teams whose members, including the surgeons themselves, form part of the specialist centre. Only those patients who could benefit from complex treatments would need to travel to the specialist centre. Our proposal is to bring as much of the specialist expertise as possible (in terms of discussing treatment options and supported decision making) to be available to patients through their local unit/team.

This would benefit patients through reducing the risk of incontinence and post-operative complications. It would ensure that we can maximise the use of latest technologies and research breakthroughs, whilst also contributing effectively to the research effort – improving the quality of life and care not just for our own population but more widely.

We believe that all complex surgery for bladder and prostate cancer and kidney cancer should be performed in one specialist centre for bladder and prostate cancer (performing around 350 operations a year) and one specialist centre for kidney cancer (performing around 300 operations a year).

A specialist centre for kidney cancer should also perform an estimated 100 operations for non-cancerous disease which are currently being carried out across all of the hospitals in *London Cancer*. Again, this is supported by the evidence that the more surgery that a hospital does, the better its outcomes are likely to be.

This would mean that single clinical teams would treat a sufficient number of patients so that they could make continuous improvements. Clinicians believe that this would put us among the best in the world for clinical quality and outcomes from urological cancer care.

Specialist centres would also mean that surgeons have access to cutting-edge equipment and are surrounded by a multidisciplinary team comprising all the right types of highly-skilled clinicians and support staff. This would allow a specialist consultant on call rota to provide optimal round the clock care.

The specialist centres would need to have strong links to high-quality local urology units to enable high quality, seamless patient care. Staff at the local units and the specialist centre would be part of the same multi-disciplinary team, bringing specialist expertise to patients along the whole pathway.

Specialist centres would also provide a focus for research and clinical trials and enable excellence in training and education. Improvements in treatments, and in the advice that we are able to give patients on their treatment decision, rely on research and clinical trials. We believe that every patient with a new diagnosis of urological cancer should be offered the opportunity to participate in clinical research. We would therefore ensure that local urological cancer units were enabled to enrol and identify patients for clinical trials.

Teaching and training of urology teams would take place at both the specialist centre and local units.

3.5.5 How would things be different if we change? – Local units

Local units would continue to have a significant role in caring for patients with urological cancers. They would provide all diagnostic tests, most elements of treatment, the majority of post-treatment follow-up and ongoing care and rehabilitation. They would continue to be the first point of contact for early specialist advice required by GPs and would work with primary care and support patients in their follow up.

The medical and nursing care in local units would be to the same high standard as that in the specialist centre. Doctors would work jointly in both the specialist and local units to make sure that patients experience continuous excellent care.

All existing urology units which meet standards of care would continue to provide local services.

3.5.6 How would things be different if we change? – The patient pathway

Specialist treatment is only a small part of a urological cancer patient's care. The vast majority of patient care would always take place at local hospital units and GP surgeries, and there would be no change in the referral patterns of GPs.

Patients with suspected urological cancer would be referred to a local unit by their GP where they would access a comprehensive diagnostic service led by a consultant urological surgeon linked to the specialist centre.

If a patient is diagnosed with urological cancer, a local multidisciplinary team would review their case in detail with the broadest range of specialists across the area. The team would aim to provide them with clear information about their condition and support them in making a decision about treatment. All local units across *London Cancer* would give patients the same high-quality, consistent information and would include a member of the specialist centre team. *London Cancer* would take the lead role in ensuring this through standards audits.

A large number of patients, particularly those with prostate cancer, would receive all of their care at a local unit and would never go to the specialist centre.

Some patients would be advised by the multidisciplinary team that they need to go to a specialist centre for their surgical treatment or radiotherapy, should they choose these treatment options. In these cases, local units would share with the treatment centre all of the relevant information that they have about the patient's care to date, including all the diagnostic tests already carried out.

Following treatment at a specialist centre, patients would return to the care of their local unit as soon as it is appropriate to do so.

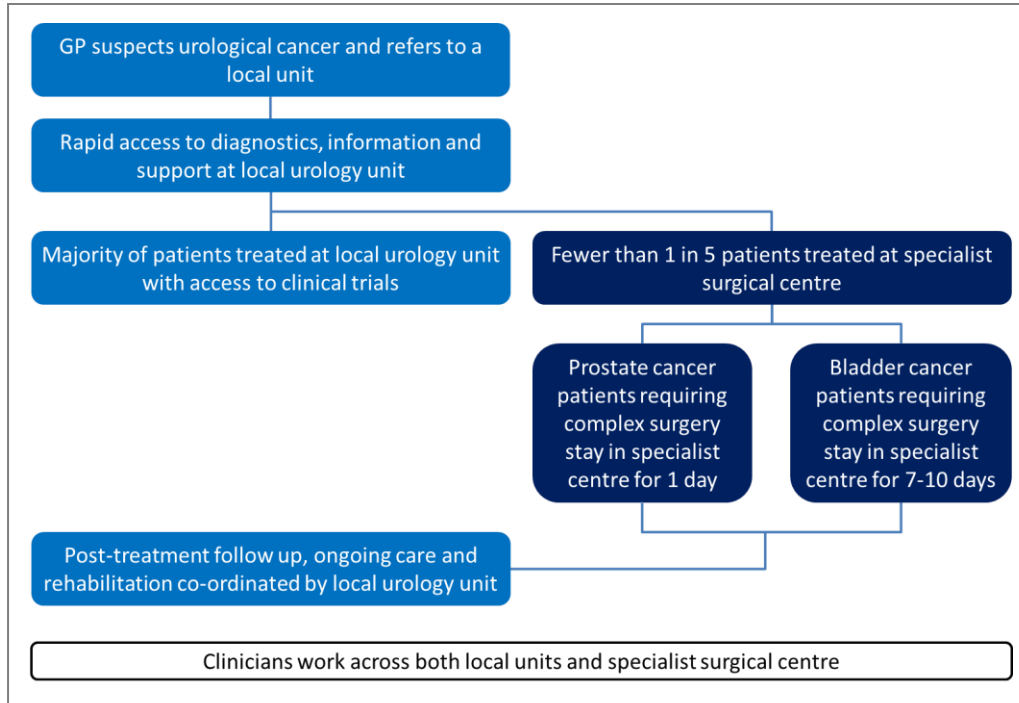
Most prostate cancer patients would be able to leave a specialist centre the day after complex surgery. Bladder cancer patients would need to stay in a specialist centre between seven to 10 days, due to the nature of the surgery. Kidney cancer patients would be able to leave a specialist centre and return to the care of their local unit around three days after complex surgery.

The local urology unit would carry out any subsequent treatments, as well as most of the ongoing care that patients require. Urological consultant specialists would work locally to oversee this care.

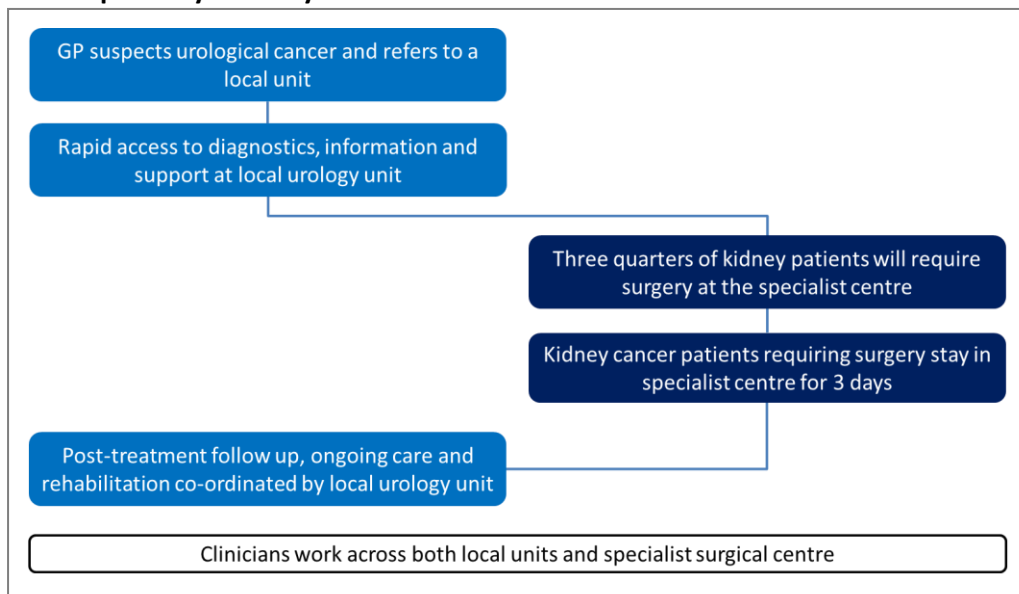
The team of staff at the specialist centre and local units would work together as a co-ordinated network, taking collective responsibility for each patient's care pathway. Clinicians involved in the

changes would have a joint contract between the specialist centre and their current hospital, ensuring that local expertise is maintained and developed. The proposals would result in more joined up research, improved quality assurance and opportunities for service improvement across the whole patient pathway.

Patient pathway – bladder and prostate



Patient pathway – kidney cancer



Reg is 65 and lives in Romford

Reg visits his GP and mentions that he's had difficulty passing urine. After a rectal examination, the GP orders a blood test to check the level of a protein called PSA. A second PSA test in two months' time shows an increase in PSA – the GP suspects Reg has prostate cancer. Reg's GP refers him to a specialist at the local urological centre for an appointment within two weeks.

The team at the local urological centre runs further tests and confirms a diagnosis of prostate cancer. The team explains the diagnosis to Reg and his family and discuss the many different treatment options, which include: monitoring the cancer (known as active surveillance), treatment with radiotherapy or brachytherapy, hormone therapy or surgery. The team give Reg clear information about the benefits and side effects of each treatment option, options to participate in research and trials, and support Reg to make the difficult decision on what course to follow.

Because of the grade of cancer, Reg decides that surgery, radical prostatectomy, would be the best course of treatment, although there are possible side effects of incontinence and impotence. Before the surgery, Reg has further tests at his local urological centre and meets a member of the specialist surgical team who will be performing the operation. Reg also has two pre-operative appointments at his local centre with a clinical nurse specialist (CNS) who explains the surgery and what to expect, giving him a chance to ask asking questions. Reg's CNS also provides detailed information on transport to and from the surgical centre in central London and explains there is a hotel near the hospital for Reg and his wife to stay on the night before his surgery if they wish.

On the day of the operation, Reg travels to the specialist urological unit at University College London Hospital where a team performs the surgery using the latest technology and medical advances. Reg stays in hospital for two days, during which time his surgical team assesses the results of the operation and ensures he is ready to go home. The hospital provides transport for Reg and his wife to travel home comfortably.

After the surgery, Reg has regular check-ups to assess how he is getting over the surgery at his local urological centre or GP surgery.

3.6 The *London Cancer Board* recommendation to commissioners for Urological cancers

The *London Cancer Board* received applications for specialist surgical centres for bladder/prostate and renal cancer in a two stage process that commenced with a call for expressions of interest against a pathway specification in August 2012. At the first stage, Barts Health and the Royal Free London expressed interest in providing a single, high volume centre for renal cancer surgery for the whole system, UCLH expressed an interest to provide the same for bladder/prostate cancer surgery and BHURT expressed an interest in providing specialist bladder, prostate and renal cancer surgical services as one of two centres for the system. These applications were considered by the *London Cancer Board* on 10 October 2012. The Board concluded that, for renal cancer, the applications from BH and RFL were more developed against the specification than the application from BHRUT. For bladder/prostate cancer, the vision to create a single, high volume surgical centre required its co-location with specialist gynaecological cancer surgery, which BHRUT was not in a position to fulfil. At this point, there was not yet full clinical consensus on the number of sites for specialist urological

cancer surgery that could best serve our population. The Medical Director of BHRUT then led discussions between the relevant trusts and their expert clinicians during October to December 2012. These concluded that the optimum configuration would be a single high volume surgical centre for each of bladder/prostate and renal cancer, because of published evidence around outcome data supporting the concept of larger centres. A revised pathway specification was issued on 19 December 2012, that included greater emphasis on leadership, organisational capacity and partnership working in order to create these 'world class' centres of surgical excellence that would make best use of all the clinical expertise in the system to drive improvement for all patients across the system.

Applications were then received from Barts Health and the Royal Free London to provide the single renal cancer surgical centre and from UCLH to provide the single bladder/prostate cancer surgical centre. BHRUT chose not to submit an application to the second stage of the process, however, Queen's Hospital would host a local unit, which would include urology diagnostics and high intensity ultrasound treatment for prostate cancer. The applications were considered by the *London Cancer Board* on 4 February 2013, together with an external expert report on the renal cancer proposals that the Board had commissioned. The Board concluded that it was satisfied to recommend to commissioners that the single centre for bladder/prostate cancer surgery should be based at UCLH, based on the following considerations:

- The trust's commitment to developing a truly world class service and enabling academic developments in oncology, surgery and translational research.
- The existing investment and experience in state of the art surgical technologies
- The vision for a model of partnership working with a network of specialist MDT clinics at local centres that hosted existing specialist surgical services.

In considering the two applications for the renal cancer surgical centre, the *London Cancer Board* recognised the high clinical quality of each of the existing services at BH and RFL. However, the Board was able to form a recommendation to commissioners that the single centre for renal cancer surgery should be based at RFL, based on the following considerations:

- The clear evidence of strategic and financial commitment of the RFL trust board to developing the service and its leadership roles
- A clear description of the patient pathway and how local services would be supported through partnership working
- The existence of an established programme to systematically publish outcome data of the trust's services, with plans for expansion

3.7 The expected benefits for patients

We are clear that as clinicians the benefits offered by our proposals for redesign are compelling and we relish the opportunity to improve care in this way. The expected benefits of the proposals are:

- Improvements in outcomes for patients having specialist surgery for urological cancers, both in the short and longer-term. A critical mass of urological cancer patients would mean that each surgeon carries out enough operations each year to continuously improve.
- We as surgeons would have access to the most up-to-date equipment and are supported by an expert team containing all of the right types of highly-skilled staff.
- As well as specialist surgery, the specialist centres would be able to deliver the most up-to-date radiotherapy, chemotherapy and targeted therapies. Shared/standardised methods would be based on best practice across the clinical teams.
- We can ensure delivery of services which are more productive and efficient through the minimisation of duplication and waste, in particular, to address the inefficient use of consultant time due to supporting a multi-site urological surgical service.
- Patients would experience a better co-ordinated pathway of care as doctors would work jointly in both the specialist and local units.
- The service is able to better attract national and international clinical staff to work in the specialty and offer higher quality clinical training to junior doctors and other health professionals.
- Round the clock consultant led rotas

3.8 The impact on patients

3.8.1 Bladder and prostate cancer

The vast majority of bladder and prostate cancer patients would continue to receive their care at an existing local urology unit. Standards of care would improve at these units, ensuring that patients receive high quality care no matter where they are.

For the 350 patients per year who need once-in-a-lifetime surgery, they would receive world-class care in a specialist unit with access to the most advanced techniques and facilities from a highly-skilled multidisciplinary team.

Patients would have the best chance of surviving their cancer and have reduced risk of incontinence and post-operative complications.

The proposals would bring further advantages for patients in terms of having access to new treatments, such as bladder reconstruction, and rapidly emerging research, such as the use of artificial bladders.

3.8.2 Kidney cancer

For the 300 patients per year who need kidney cancer surgery, and 100 patients per year who need non-malignant kidney surgery, they would receive world-class care in a specialist unit with access to the most advanced techniques and facilities from a highly-skilled multidisciplinary team.

While kidney cancer is relatively rare, the majority of patients require surgery. Currently, nine hospitals in *London Cancer* perform small amounts of surgery.

Patients would have a better chance of reduced complications and retaining better kidney function, following their specialist surgery. This would help to improve the quality of life for kidney cancer patients.

3.8.3 Travel and patient choice

We are committed to only asking patients to travel further when it is absolutely necessary for them to receive specialist care. Specialising complex urological cancer surgery in fewer hospitals would mean an increase in travel times for some patients and a reduction in the choice of hospitals providing this type of surgery. However, clinicians believe that the proposals would greatly enhance our ability to provide a greater range of treatment options to each patient and to deliver the highest quality care and better outcomes for patients.

We estimate that around 200 to 250 bladder and prostate cancer patients requiring complex surgery (11% - 13% of all bladder and prostate cancer patients) per year would need to travel to a different hospital for their surgery. For kidney cancer, we estimate that around 220 to 270 patients per year would need to travel to a different hospital for their surgery. Clinicians believe that the benefits of reduced risk of post-operative complications and reduced risk of long-term incontinence far outweighs any inconvenience in further travel to receive the very best specialist care.

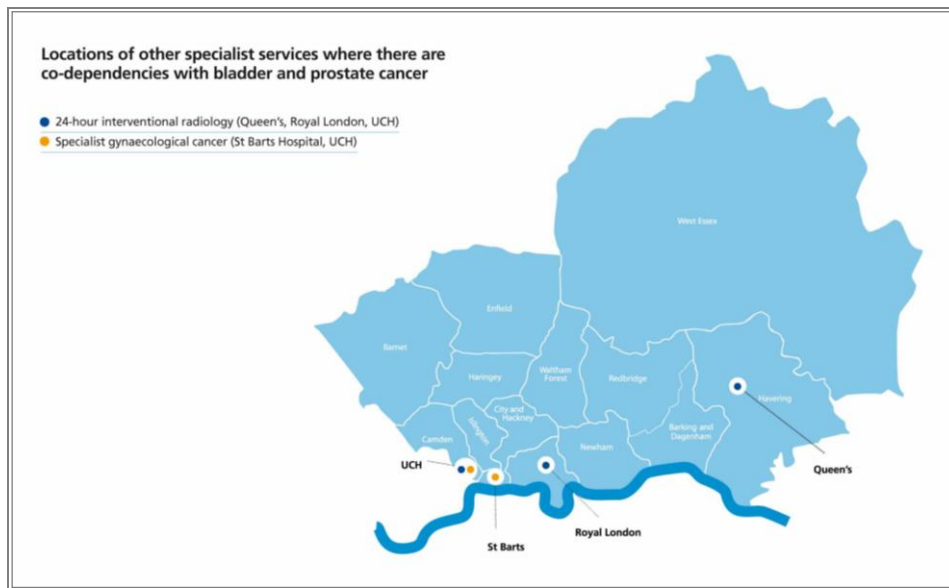
Many patients are already bypassing their local hospital to go to a hospital providing urological cancer surgery. Greater specialisation would increase the distances that some patients would need to travel. We would consider the impact on travel for patients and carers as we develop firm proposals for transforming urological cancer care. Patient groups are providing views on the travel implications for these proposals. Among the options being considered are improved car parking and taxi services for those in need.

3.9 Key considerations

A group of doctors, nurses and patients from across *London Cancer* has developed a clear specification and standards for the care that we would expect from local and specialist units caring for bladder and prostate and kidney cancer patients⁴².

Surgery for bladder and prostate cancer patients can have serious complications. The bladder and prostate specialist centre needs access to 24-hour interventional radiology as well as to pelvic emergency surgery. Clinicians would also want to co-locate the bladder and prostate cancer centre in a hospital which has specialist gynaecological cancer surgery. This is more important than being in the same place as kidney cancer surgery.

⁴²London Cancer, *Pathway specification for urological cancers*, 2012

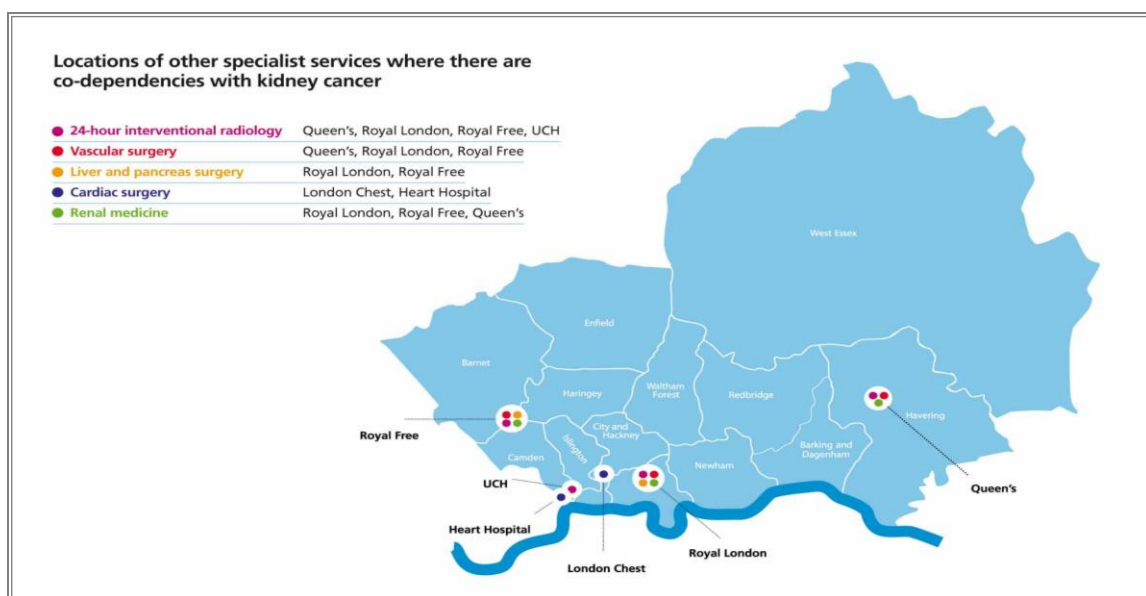


Kidney cancer surgery is very complex and there can be serious complications. Surgery should take place near services such as 24-hour interventional radiology and vascular surgery so that they can respond to critical life threatening complications (such as haemorrhage).

The kidneys are close to other organs so kidney cancer surgery should ideally be carried out in a hospital with liver and pancreas surgeons. Kidney cancer can occasionally spread through blood vessels to the heart; and the cases may need specialist assistance from a cardiac surgeon. This would be a planned procedure.

Kidney cancer surgery should also take place in a hospital that has renal medicine and dialysis facilities; some patients will need their kidneys to be supported by dialysis during and after their surgery.

Being near these services is more important for kidney cancer surgery than being in the same hospital as prostate and bladder surgeons.



3.10 Appendix – volume and outcome in urological cancers

A 2004 systematic review concluded that outcomes after radical prostatectomy and cystectomy are on average likely to be better if these procedures are performed by and at high volume providers⁴³. This review found the evidence for a similar effect in radical nephrectomy unclear.

A separate review in 2004 stated that the evidence that high volume hospitals have better outcomes from various types of urological cancer surgery was increasing⁴⁴. It concluded that the ultimate implication of these studies was that centralising health care may yield better outcomes from urological cancer operations. It noted that this would be controversial and suggested that another approach would be to determine key factors that are the drivers behind better outcomes at high-volume centres and attempt to transfer those characteristics to lower-volume centres.

A recent study from 2012 concluded that higher volume surgeons perform partial nephrectomy more often, show a lower complication rate and may have a lower in-hospital mortality rate than lower volume surgeons⁴⁵.

Another study from 2012, this time into bladder cancer, concluded that ninety-day cumulative mortality after cystectomy for bladder cancer was significant and may be associated with hospital cystectomy volume⁴⁶.

A further study from 2012 stated that after adjustment for patient and disease characteristics, the relationship between surgeon volume and survival after radical cystectomy is accounted for by hospital volume⁴⁷. It concluded that, in contrast, hospital volume remained an independent predictor of survival, suggesting that structure and process characteristics of high volume hospitals drive long-term outcomes after radical cystectomy.

The overwhelming majority of the literature on the effect of the volume-outcome relationship in urological cancer is with regard to radical prostatectomy.

⁴³ M Nuttall, J Van Der Meulen, N Phillips, C Sharpin, D Gillatt, G McIntosh and M Emberton, A Systematic Review and Critique of the Literature Relating Hospital or Surgeon Volume to Health Outcomes for 3 Urological Cancer Procedures, *The Journal of Urology* Vol. 172, 2145–2152, December 2004

⁴⁴ F N. Joudi, B R. Konety, The Volume/Outcome Relationship in Urologic Cancer Surgery, *Supportive Cancer Therapy*, Volume 2, Number 1, October 2004

⁴⁵ R Abouassaly, A Finelli, G A. Tomlinson, D R. Urbach and S M. H. Alibhai, Volume-Outcome Relationships in the Treatment of Renal Tumors, *The Journal of Urology* Vol. 187, 1984-1988, June 2012

⁴⁶ M P. Porter, J L. Gore, J L. Wright, Hospital volume and 90-day mortality risk after radical cystectomy: a population-based cohort study, *World Journal of Urology* (2011) 29:73–77

⁴⁷ T M. Morgan, D A. Barocas, K A. Keegan, M S. Cookson, S S. Chang, S Ni, P E. Clark, J A. Smith, Jr. and D F. Penson, Volume Outcomes of Cystectomy—Is it the Surgeon or the Setting? *The Journal of Urology* Vol. 188, 2139-2144, December 2012

4 Head and neck cancer

4.1 Summary

Patients with head and neck cancer require high levels of specialist complex care. The clinicians at *London Cancer* want to ensure a future where all patients have the best possible outcomes and experience and believe that a reconfiguration of services will strengthen the overall quality of diagnosis and management of head and neck cancers.

There are many areas of long-standing good practice within *London Cancer*. Our proposal is to build on these to create a high volume surgical centre that brings together all the experts within our region to provide the best care possible to all patients.

The current configuration of three surgical centres cannot achieve the highest standards of care that we want to provide for all head and neck cancer patients. **We recommend that there should be one specialist head and neck surgery centre in *London Cancer*.** This would create one of the largest head and neck centres in the UK, offering cutting-edge techniques such as robotic surgery and advanced reconstructive techniques. Centralisation would aim to improve surgical outcomes such as reducing complications and reducing the time patients need to be in hospital, assisting recovery and improving patient experience.

In partnership with the surgical centre we aim to continue to provide services as locally as possible for our patients, reducing the length of time from referral to first appointment to five working days. Similarly, diagnostic requests would be reported within five days of request. Rapid diagnostic clinics with dedicated head and neck ultrasonography and cytology would be run at several centres throughout the system. A multidisciplinary follow-up clinic with surgeons, oncologists, CNS, speech and language therapy and dietetics would also be available for patients close to home.

The number of Multidisciplinary Teams (MDTs) would be reduced from three to one, (although operating across two multidisciplinary team meetings), with a concentration of expertise allowing for greater research and trial participation. There is already a strong collaborative approach which would continue to foster improvements to outcomes, patient experience and trial participation for our patients. Advanced radiotherapy techniques such as intensity-modulated radiation therapy (IMRT) would be available to all appropriate patients at centres across the integrated cancer system (ICS). Similarly, access to cutting edge techniques such as Cyber Knife and Proton Beam Therapy would be available to all appropriate patients in future.

The following chapter makes the case for changing the current services for head and neck cancer. Our aspiration focuses on the entire pathway ensuring we are providing the absolute optimum treatment pathway. There has been emphasis on trying to maintain local services in so far as it is possible to minimise additional travel for our population, and to ensure that high quality services are in place that have the ability to see patients as soon as possible.

4.2 Background

4.2.1 *London Cancer*

We, as clinical specialists in head and neck cancers, have welcomed the opportunity provided by the *London Cancer* integrated system to bring together a wide body of clinical experts, united in a vision

of what can be done through collective effort to improve head and neck cancer care and research. The proposals contained here have been developed by us as the *London Cancer* Head and Neck Pathway Board, taking the available evidence and known good practice as a guide and our knowledge and understanding from caring for local people. Representatives of all of the NHS trusts within *London Cancer* that may take part in the head and neck cancer pathway have come together in developing these proposals, including:

- Barnet and Chase Farm Hospitals NHS Trusts
- Barts Health NHS Trust
- Barking, Havering and Redbridge University Hospitals NHS Trust
- Homerton University Hospital NHS Foundation Trust
- North Middlesex University Hospital NHS Trust
- Princess Alexandra Hospital NHS Trust
- Royal Free London NHS Foundation Trust
- University College London Hospitals NHS Foundation Trust
- Whittington Health NHS Trust

4.2.2 Head and neck cancer surgery

The majority of these types of cancer arise from the surface layers of the upper aerodigestive (UAT) tract: the lip, mouth (oral cavity), the upper part of the throat and respiratory system (pharynx), and the voice-box (larynx). Other UAT areas include the salivary glands, nose, and sinuses, but these cancers are relatively rare. Cancers that originate in the connective tissues of the head and neck are even rarer.

Most patients with head and neck cancers are middle-aged or older. Survival rates differ markedly according to the site and stage of the cancer.

Surgery is considered the primary treatment for most types of head and neck cancer. However, an increasing number of head and neck cancers are treated with a chemotherapy and radiotherapy regimen as a primary or adjuvant treatment. There are benefits in providing a reasonably centralised service due to the number of specialties involved (maxillofacial; ear, nose and throat (ENT); plastic surgeons; clinical oncologists; speech and language therapists; dieticians; restorative dentists; and clinical psychologists); the benefits include ensuring patients have prompt access to the relevant specialists, thereby reducing delay to treatment, minimising unnecessary hospital visits, and thereby creating less uncertainty for patients.

Given the proximity of these cancers to the face or to various critical structures in the head and neck that provide functions such as speech, swallowing, breathing and eating, a large multi-disciplinary team of specialists is usually involved in the treatment and care of patients with head and neck cancers. The *Model of care* for cancer services in London suggests that “there are benefits of providing a reasonably centralised service due to the number of specialties involved (maxillofacial; ear, nose and throat (ENT); plastic surgeons; clinical oncologists; speech and language therapists; dieticians; restorative dentists; and clinical psychologists).”

4.3 Current services

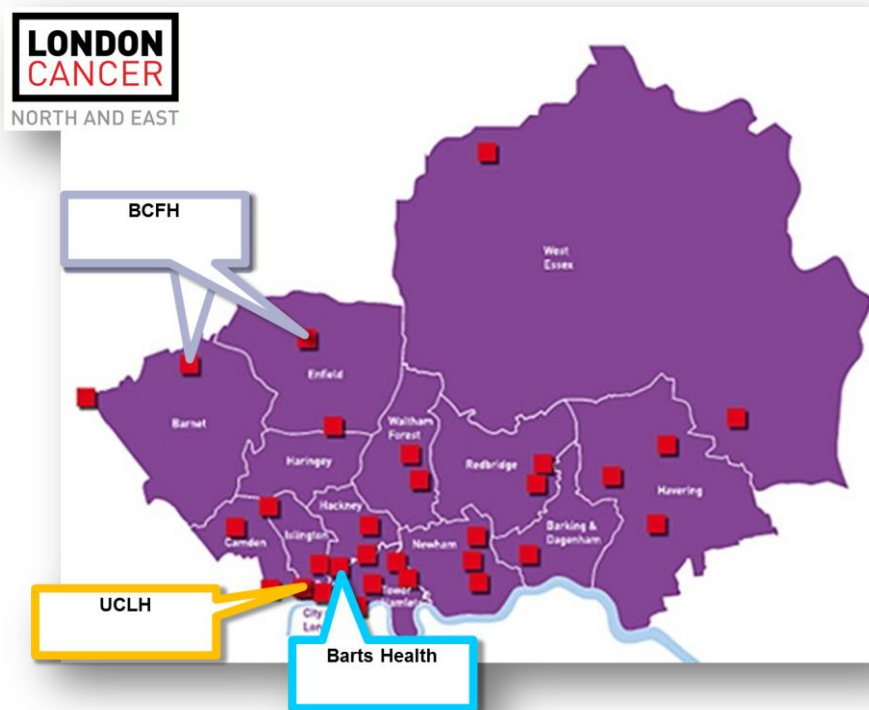
4.3.1 London Cancer services

All our complex surgery for head and neck cancer is currently carried out at three *London Cancer* centres:

- **Chase Farm Hospital**—part of Barnet and Chase farm Hospitals NHS Trust (BCFH)
- **St. Bartholomew’s Hospital**—part of Barts Health NHS Trust (BH)
- **University College Hospital**—part of University College London Hospitals NHS Foundation Trust (UCLH)

Only diagnostic procedures (such as biopsies) and management of local T1 (localised) lesions with no reconstruction required would be treated at local hospitals, as reflected in guidelines. All surgeons who undertake head and neck cancer surgery are part of a Head and Neck Cancer centre MDT.

Figure 1: Location of *London Cancer*’s head and neck cancer surgery centres



4.3.2 Other services

The clinical community treating head and neck cancer patients is broad. Hence, we work with colleagues across the locality. Other choices of sites for patients requiring surgical treatment in London, but outside *London Cancer* are Charing Cross Hospital (Imperial Healthcare Hospitals Trust) and Northwick Park Hospital (North West London Hospitals NHS Trust). In the Essex area, Broomfield Hospital (Mid Essex Hospital Services NHS Trust) offers head and neck cancer services.

Thyroid cancer

Thyroid cancer is generally treated by surgery. In *London Cancer* there are separate thyroid MDTs, as appropriate according to NICE Improving Outcomes Guidance and meeting British Association of Endocrine and Thyroid Surgeons guidelines, each serving a population of 1 million people. These MDTs are located at Barts Health, the Royal Free London NHS Foundation Trust and University

College London NHS Foundation Trust (the latter operates a regional service for certain patient groups). The Head and Neck Cancer Pathway Board within *London Cancer* is focusing on increasing data availability and transparency in thyroid cancer, and the upcoming publishing of surgical outcomes nationally will include thyroid surgery. We plan to review and make any recommendations on thyroid cancer during 2014.

Salivary Gland Surgery

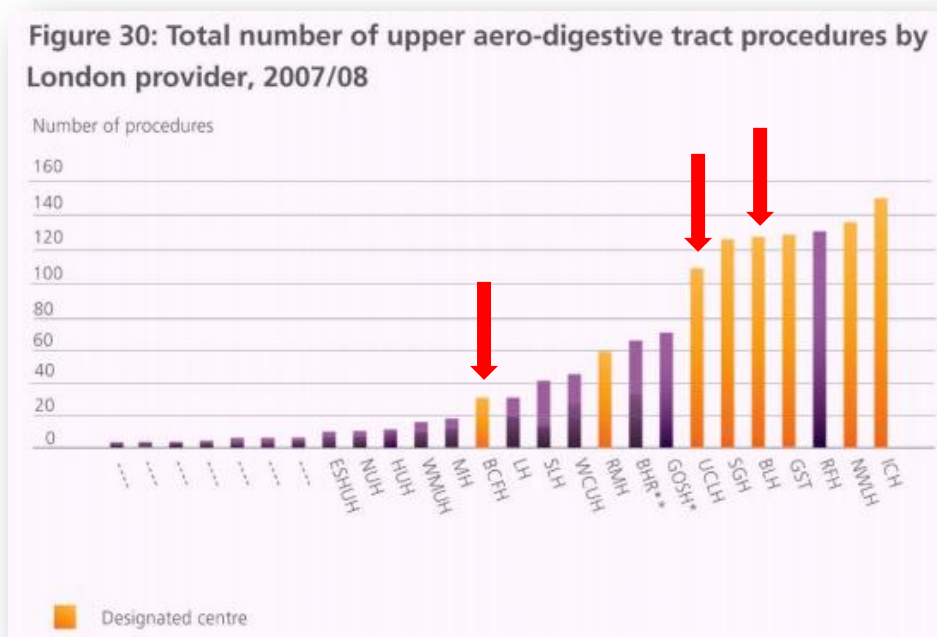
Surgery for cancers of the salivary gland is part of the surgical centre MDTs' workload, so it would continue to be collocated with specialist head and neck cancer surgery, with relevant expertise available.

Pituitary and Skull Base Surgery

All pituitary and skull base tumour surgery is carried out at University College London NHS Foundation Trust, at the National Hospital for Neurology and Neurosurgery, which is a regional hub for brain and central nervous system cancer surgery. Our services here meet the requirement for such surgery to take place within a trust that has both specialist head and neck cancer surgery and neurosurgery for cancer.

4.3.3 Hospital volumes

We know that our systems for clinical data recording and coding are not optimal, which we as clinicians are working to change, but this means that due to difficulties in accurate data capture, the information provided here is several years old. However, the chart reproduced below from the London-wide *Case for Change* shows that Barts Health ('Barts and the London' in the chart) reported a total of around 125 head and neck procedures between 2007 and 2008. UCLH reported a total of around 110 procedures, and BCFH reported a total of around 30 procedures over the same period. In 2007/08 there were 26 providers of head and neck surgical cancer services in London. This has since been reduced to seven providers as the need to consolidate specialist services has been supported by clinicians for many years.



4.3.4 Non-surgical treatment

Radiotherapy can be used on its own to treat cancers that are small and haven't spread, often being used for cancers in harder-to-reach areas such as the back of the mouth or throat. Radiotherapy may also be used when surgery could seriously affect important functions such as speech and swallowing. If a cancer in the head or neck is larger, or is affecting other tissues nearby (locally advanced cancer), radiotherapy is usually combined with other treatments.

Radiotherapy may be given⁴⁸:

1. after surgery (with or without chemotherapy) to destroy any remaining cancer and reduce the risk of cancer coming back
2. in combination with chemotherapy (chemoradiation), without surgery
3. in combination with targeted drug therapy
4. to reduce symptoms caused by a tumour (palliative radiotherapy).

Intensity-modulated radiation therapy (IMRT) is an advanced mode of high-precision radiotherapy that uses computer-controlled linear accelerators to deliver precise radiation doses to conform more precisely to the three-dimensional shape of a tumour. Intensity-modulated radiation therapy is being used in head and neck cancer as it has been shown to reduce side-effects of treatment, by damaging less of the healthy tissue surrounding the tumour.

Specialist non-surgical treatment (oncology) is provided at Barking, Havering & Redbridge Hospitals NHS Trust, Barts Health, North Middlesex University Hospital NHS Trust, and University College London NHS Foundation Trust.

When chemotherapy is given to treat head and neck cancer, it's usually given in combination with radiotherapy. Very occasionally, chemotherapy is given before surgery to shrink the tumour and make it easier to remove. Sometimes chemotherapy is given to relieve symptoms and improve quality of life if it's not possible to cure the cancer. This is called palliative chemotherapy.

The NICE Improving Outcomes Guidance for Head and Neck Cancers⁴⁹ stipulates that specialist multidisciplinary teams should serve populations exceeding one million. All surgery should be provided by a specialist multidisciplinary team in a designated centre, and surgeons and their teams should manage a minimum of 100 new cases of head and neck cancer a year.

4.3.5 Rehabilitation

Our clinical community strongly believes that provision of local, community-based rehabilitation teams for patients are vital, including oral rehabilitation, physiotherapy, speech and language therapy and swallowing rehabilitation. The holistic needs of patients should also be assessed and addressed. These services must be equally accessible and funded across all areas. We know that at the moment this is not the case, as only 40% head and neck cancer patients responding in the 2012 National Cancer Patient Experience Survey felt that they received enough help in the community after leaving hospital.

⁴⁸ <http://www.macmillan.org.uk/Cancerinformation>

⁴⁹ NICE, Improving Outcomes in Head and Neck Cancers, 2004

4.4 Why we need to change

4.4.1 Surgical and hospitals volumes – the evidence base

As detailed already in this Case for Change, since the 1970s, a large body of clinical evidence has shown that larger volume surgical centres have the best outcomes for many types of cancer surgery, and the same is true of surgeons who undertake higher numbers of procedures.

In addition to this generic evidence for a relationship between surgical and hospital volumes, there is also a wealth of evidence specific to head and neck cancer⁵⁰.

4.4.2 London perspective

We know that at the moment, not all patients whom we treat for head and neck cancer are getting the very best service possible. We have several areas where, as clinicians, we need to do better, and which we are delighted to note have been supported by recent commissioning strategies. For head and neck cancers the London-wide *cancer Case for Change 2010* notes that there are benefits of being a centralised service, particularly due to the number of specialties involved (maxillofacial; ear, nose and throat; plastic surgeons; clinical oncologists; speech and language therapists; dieticians; restorative dentists; and clinical psychologists). In London there is a rationale for future consolidation given these complexities and the high level of specialist expertise required.

The resultant *Model of Care* in 2010 noted the following recommendations:

- Five surgery providers should be commissioned to deal with both UAT cancers and thyroid cancers (**maximum 2 centres for the London Cancer area**), as consolidated services are able to achieve the best outcomes for patients. Thyroid cancers should be managed as part of the specialist head and neck multidisciplinary team.
- Rapid access diagnostic one-stop clinics should be established locally for patients with neck lumps and these should be integrated with equivalent services for haematological cancers.
- Base of skull and pituitary tumours should be differentiated from other head and neck cancers. Two centres should be commissioned for their treatment in London, collocated with two of the specialist head and neck centres that also have neurosurgery services.

As clinical experts we know, and this is recognised in the *Model of Care*, particularly where head and neck cancer services are concerned, there is a balance to be struck between centralisation of services that enables the co-location of relevant specialities involved in treatment and care and the local provision of services that promotes the principle of seamless care closer to home. The London-wide *Model of Care* concluded there was sufficient evidence to recommend that London commissioners should consolidate head and neck cancer surgery further. It recommends that, “five surgery providers should be commissioned to deal with both head and neck cancers and thyroid cancers.”⁵¹ This equates to one or two centres for the area covered by the *London Cancer ICS* (a

⁵⁰ See for example - Outcomes in head and neck oncologic surgery at academic medical centers in the United States. <<http://www.ncbi.nlm.nih.gov/pubmed/23444189>>, Multivariate analyses to assess the effects of surgeon and hospital volume on cancer survival rates: a nationwide population-based study in Taiwan. <<http://www.ncbi.nlm.nih.gov/pubmed/22815771>>

⁵¹ NHS Commissioning Support for London (2010). *A model of care for cancer services: Clinical paper*, pp.86-88. (<http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-model-of-care.pdf>).

population of 3.2 million, with inflows of patients expected). In 2012's further work and *Addendum*⁵² to the *Model of Care* supported this.

4.4.3 Local perspective

Within *London Cancer* there are currently three centres providing specialist surgery for head and neck cancers: The Royal London Hospital (Barts Health NHS Trust), University College Hospital (University College London Hospitals NHS Foundation Trust), and Barnet and Chase Farm Hospitals (Barnet and Chase Farm Hospitals NHS Trust).

As well as our vision to improve and the London-wide cancer recommendations, local changes are also impacting on head and neck cancer services. *The Barnet, Enfield and Haringey Clinical Strategy*, published in September 2011,⁵³ has made a series of recommendations regarding the future delivery of services at Barnet and Chase Farm Hospitals NHS Trust. If the implementation of the proposed strategy is agreed in 2013, the Chase Farm site would no longer be able to provide complex, specialist head and neck oncology surgery. Of the other two centres, Barts Health and UCLH, the sites carrying out these surgeries are 4 miles apart, whilst we know from our own practice that they are much aligned clinically and with good professional working relationships across organisations; in the face of being able to deliver improved outcomes, better continuity of service and economies of scale to enable service innovation; the arguments for keeping these two sites which are so close together in the centre of London (where many patients already have to travel), rather than bringing them together as a single service, are not defensible.

We believe that consolidating surgery to fewer sites will yield the most benefit for our patients. A unified specialist surgical team could continuously improve its expertise through carrying out the largest possible number of surgical cases per annum, supported by dedicated highly-specialist multidisciplinary expertise, including during the perioperative period. This is why *London Cancer* recommends to commissioners of cancer care in London that there be only a single site for complex head and neck cancer surgery.

4.4.4 Drivers for change

There are a number of drivers for the changes proposed to pathways for head and neck cancer within the *London Cancer* ICS:

- *London Cancer's* head and neck clinicians have received and fully support a commitment to implement the recommendations of the *model of care* for cancer services in London⁵⁴ concerning the consolidation of specialist services, as this provides a clear commissioning strategy, evidence base and rationale for improvement.
- Recognition of the fact that centres within our area are performing fewer than the 100 procedures required by the NICE Improving Outcomes Guidance (IOG) for head and neck cancer.⁵⁵
- The Barnet, Enfield and Haringey Clinical Strategy,⁵⁶ and the possibility that, due to changes planned at Barnet and Chase Farm Hospitals NHS Trust, complex surgery may be moving to

⁵² The Model of Care for Cancer Services – Addendum to the Clinical paper. London Health Programmes, January 2012. See *Appendices*.

⁵³ Enfield CCG. (2011). *op. cit.*

⁵⁴ NHS Commissioning Support for London (2010). *A model of care for cancer services: Clinical paper*. (<http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-model-of-care.pdf>).

⁵⁵ NICE, *Improving Outcomes in Head and Neck Cancers: The Manual*, November 2004.

other sites as an interim measure, since it could not be sustained at Chase Farm Hospital should its High Dependency Unit (HDU) close during 2013/4.

- We strongly believe that the opportunities presented for improvement to care and research by a single MDT and surgical centre would benefit patients, the workforce and future development of new treatments and the knowledge base for head and neck cancer through strengthened research potential.

4.5 What we need to do

Further detail on the proposed model of care for the head and neck cancer pathway in *London Cancer* is provided in the *London Cancer Service specification for head and neck cancer*, April 2013.⁵⁷ Some highlights of the changes and the reasons for them are described here.

4.5.1 How would things be different if we change? – Strengthening local services

What needs to change

Often at the moment, the diagnosis of head and neck cancer can take a long time, as patients may be referred to several different services, require numerous tests and wait for test results. Often how well they are coping with symptoms such as discomfort or problems swallowing are not acknowledged or managed at this time. This is shown in the fact that only 60% head and neck cancer patients responding to the 2012 National Cancer Patient Experience Survey felt they were seen as soon as necessary. Moreover,

- Only **60%** felt they were seen as soon as necessary
- Only **56%** felt their tests were explained to them
- **Over 20%** felt their symptoms/health got worse whilst waiting for diagnosis

What we need to put in place

No more than five working days should elapse between referral and the first appointment in a specialty consultant-led clinic. The consultant should be someone from the ENT or oral maxillofacial (OMFS) service trained to diagnose and request appropriate investigations. Patients should undergo nutritional screening at this point using a system-wide validated screening tool. This would provide baseline nutritional status to facilitate MDT decision-making. If appropriate, the patient should be referred to a rapid diagnostic clinic (either in-house or elsewhere) **within one week** where more complex tests can be done straight away to confirm or exclude cancer.

4.5.2 How would things be different if we change? – Discussing treatment options

What needs to change

Not all patients currently have access to a key worker at diagnosis and follow-up; holistic needs assessment is not widely carried out and not all patients have access to dietetic, and speech and language input, as specialist staff are spread too thinly. Poor communication between local units and specialist centres, between secondary and primary care and between providers of support services, results in poor patient experience and inefficiency. This means that **only 36%** patients can report that all the people taking care of them worked well together⁵⁸.

⁵⁶ Enfield CCG, The Barnet, Enfield and Haringey Clinical Strategy, September 2011.

⁵⁷ London Cancer, *Service specification for head and neck cancer*, 2013.

⁵⁸ National Cancer Patient Experience Survey, Quality Health, 2012.

What we need to put in place

Patients would be offered all appropriate treatment options, as recommended by the hub MDT, by members of that team, and all appropriate types of reconstruction whether or not these are available at that particular provider site. The decision-making process involves rehabilitation and supportive care professionals to enable a richer, more holistic understanding of the patient's broader circumstances.

4.5.3 How would things be different if we change? – Post-treatment follow-up in primary care

What needs to change

At present, staff working in local hospitals may not be able to provide comprehensive specialist follow-up care to post-operative patients, resulting in the need for patients to travel to the centre for appointments. The continuity of care for patients is poor, as local surgeons or other staff will not necessarily be the surgeon or professional who has treated the patient as part of the centre's surgical team. Some joint appointments exist, but there is no comprehensive outreach model for the specialist centre multidisciplinary team to peripheral sites.

What we need to put in place

Our aspiration is that patients do not need to return to the specialist surgical centre after treatment: their ongoing care and management can be adequately provided closer to home in a local hospital or in partnership with primary care in the community.

Regular patient follow-up clinics should be held locally, which involve:

- Surgeon
- Oncologist
- CNS
- Rehabilitation and supportive care specialists (speech and language therapists, dieticians, occupational therapists, physiotherapists)
- Palliative care

4.5.4 How would things be different if we change? – Consolidation of specialist surgery

What needs to change

Surgery encompasses both diagnostic procedures and definitive treatment either alone or in combination with other treatment modalities, such as radiotherapy and chemotherapy. The range of surgery varies from simple day case procedures to complex cases involving micro-vascular reconstruction. Specialist nursing and medical skills are required for these patients to deal with issues such as airway maintenance, flap and wound care. At the moment our surgical centres have poor enrolment in clinical trials, and inconsistent data collection on outcomes. There are no enhanced recovery programmes in place and cutting edge treatments, such as robotic surgery are not available to all.

What we need to put in place

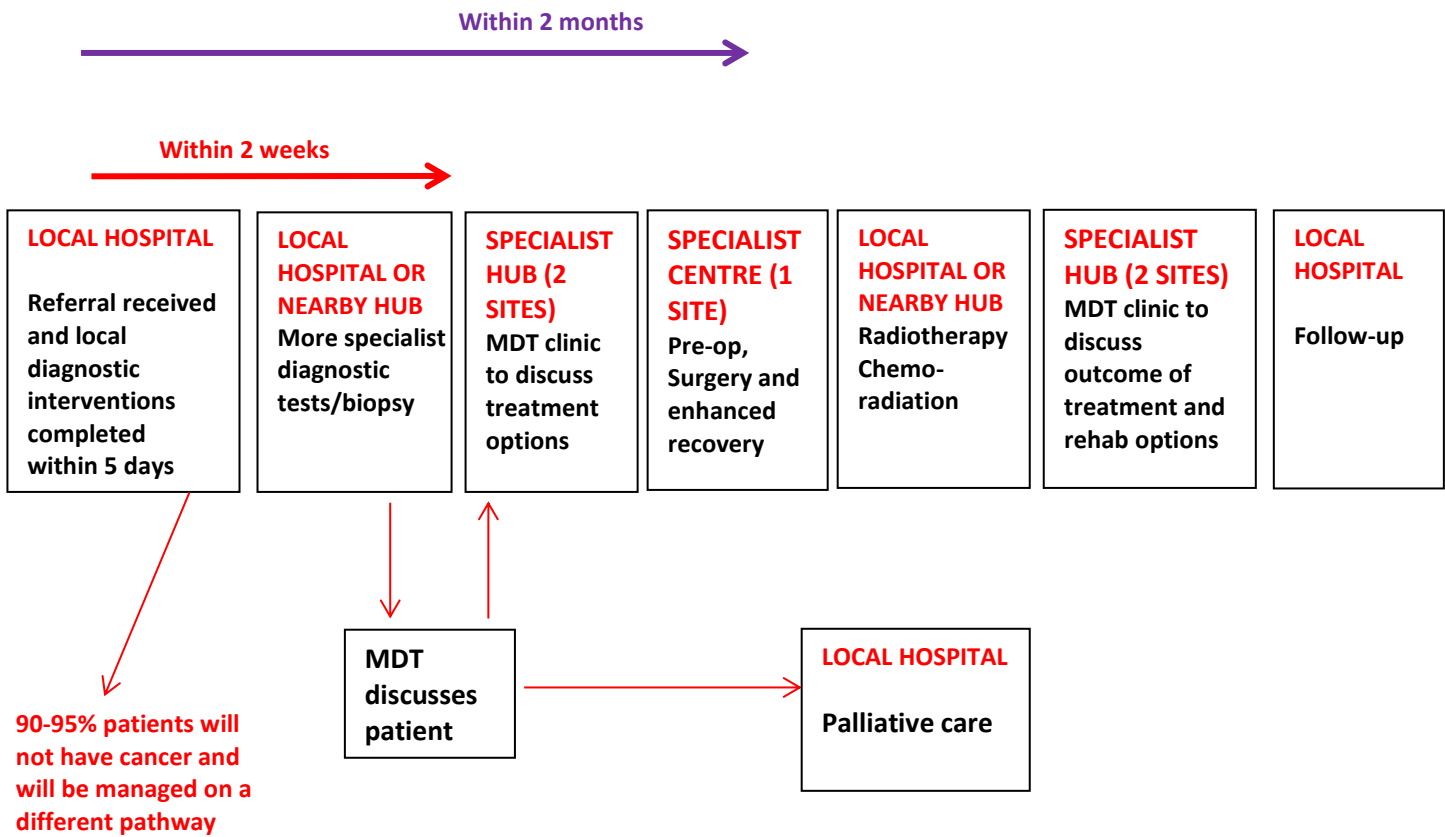
There is broad agreement locally, nationally and internationally in the cancer surgical community that a single centre undertaking large volumes of specialist surgery is likely to lead to improved surgical outcomes, fewer short and long term complications, better functional outcomes for patients and a better patient experience. This effect is seen not just at the level of the individual surgeon doing more operations, but also at the hospital level for a 'high volume' team. Much of this evidence is cited earlier in this document and in the London *Case for Change*. Given the populations covered by the two ICSs in London, **the head and neck cancer technical group and Pathway Board**

concluded that a single specialist centre should be established coordinating all complex head and neck cancer surgery.

In addition to surgeons achieving better outcomes from doing the same operations more regularly, a larger volume centre that is well staffed with specialist nurses, anaesthetists and therapists would be able to develop and deliver an enhanced recovery programme for head and neck cancer patients. Enhanced recovery has been shown not only to reduce the time patients need to spend in hospital, but also to speed recovery and return to mobility, as well as improving patients' experience of surgery and rehabilitation. The management of patients post-operatively through a single pathway from the surgical centre would also provide more opportunities to innovate and conduct research into cancer survivorship and long-term effects of treatment.

We acknowledge that this outcome would not be achieved immediately, and therefore a phased approach to implementation would be required, initially involving a managed reduction from three to two centres, which would work together as a single, unified service. If agreed with commissioners, any implementation would be planned and overseen carefully with providers and partners across the area to ensure that all service requirements are in place and quality of services is maintained.

4.5.5 Example patient pathway from the proposals



4.6 The *London Cancer* Board recommendation to commissioners for Head and Neck cancer

The *London Cancer* Board received a single application from UCLH to provide a specialist head and neck cancer surgery centre and considered this on 3 July 2013. Barts Health and Barnet & Chase Farm trusts chose not to make a submission but to support the application from UCLH to develop a single, high volume surgical centre at UCLH. The Board concluded that it was satisfied that it could recommend to commissioners that the centre for the *London Cancer* population should be based at UCLH based on the following considerations:

- The size and substantial investment in its existing complex dedicated facilities and specialist multi-disciplinary staff.
- The co-location within a single trust of the Royal Throat, Nose and Ear Hospital services, specialist base of skull tumour surgery at the National Hospital for Neurology and Neurosurgery and the regional sarcoma service, all of whose expertise may be required for head and neck cancer surgery.
- The co-location with advanced reconstructive techniques and the planned proton beam radiotherapy centre at UCLH, a specialist form of radiotherapy for which head and neck cancer patients are often eligible.
- The ease of compliance with current and anticipated national standards
- A clear vision and plans for investment in partnership working with 'hub' MDTs at other trusts to improve the patient pathway.

4.7 The expected benefits for patients

We would see so many benefits for our patients, which can be summarised as:

- Improved local diagnostic times, meaning less uncertainty and delay for patients at the start of the pathway.
- Multidisciplinary clinics which allow patients to meet their specialist surgeon and discuss all treatment options with input from a skilled and supportive team.
- Improvements in outcomes for patients having specialist surgery for head and neck cancers, both in the short and longer-term. A critical mass of head and neck cancer patients would mean that each surgeon carries out enough operations each year to continuously improve. This would mean lower complication rates from surgery.
- Strengthened multidisciplinary follow-up clinics at local sites through a single team providing outreach and joint appointments. Patients would experience a better co-ordinated pathway of care as doctors would work jointly in both the specialist and local units.
- Our surgeons have access to the most up-to-date equipment and are supported by an expert team containing all of the right types of highly-skilled staff.
- As well as specialist surgery, our specialist centres would be able to deliver the most up-to-date radiotherapy, chemotherapy and targeted therapies. Shared/standardised methods would be based on best practice across the clinical teams.
- A larger volume centre would be able to develop and deliver an enhanced recovery programme for head and neck cancer patients, which we have a strong desire to do but have not yet achieved the critical mass to implement. This has been shown not only to reduce the time patients need to spend in hospital, but also to speed recovery and return to mobility, as well as improving patients' experience of surgery and rehabilitation.

The expected benefits of the proposals for health services and research are very exciting to us as clinical experts:

- Delivery of services which are more productive and efficient through the minimisation of duplication and waste
- Higher volumes of surgery provide increased confidence in the measurement of outcomes, so helping to understand variation and drive improvements in quality more quickly
- The service is able to better attract national and international clinical staff to work in the specialty and offer higher quality clinical training to junior doctors and other health professionals, helping us sustain world-class standards into the future.
- A single MDT and surgical centre would provide much easier coordination of new research in the disease, as well as providing more opportunity for all patients to be considered for and access available clinical trials.

4.8 The impact on patients

The pathway that patients follow would not be changed significantly by these proposals. Presently patients with suspected head and neck tumours are investigated and diagnosed locally, and then attend a centre to discuss their treatment and are treated at one of three head and neck surgery centres, two of which are in central London. Under these plans, more follow-up can be provided locally so travel for this would be reduced; oncology would still be provided at all current sites. In the future patients would follow the same pathway, with the exception of coming into one centre for discussion about their treatments with the aim to provide services to even higher quality.

We know that patients understand the reasons for consolidation of specialist services, but that if they and their families have to travel further they want their transport needs taken into account. The impact of further consolidating head and neck services in inner London by 4 miles is unlikely to have a large impact on patient travel. The additional travel to central London would only affect patients currently having surgery at Chase Farm Hospital (fewer than 30 cases per annum). Travel distance between Chase Farm and UCLH is 12 miles, and 13 miles to the Royal London Hospital (Barts Health). Alternatively, head and neck cancer surgery is also provided at Charing Cross Hospital or the Lister Hospital in Stevenage distances of 20 miles and 25 miles from Chase Farm respectively.

5 Acute myeloid leukaemia services and haematopoietic stem cell transplantation

5.1 Summary

This review covers services for acute myeloid leukaemia (AML) and haematopoietic stem cell transplant (HCST) centres.

For patients with acute myeloid leukaemia (AML), clinicians on the *London Cancer* Haematological Malignancies Pathway Board have proposed there should be a minimum activity level of ten new patients treated intensively, on average each year. Clinicians consider that this threshold would ensure each unit sees sufficient numbers of patients with newly diagnosed and relapsed AML, requiring intensive therapy at any one time, to maintain the skills and the knowledge base of medical and nursing staff, especially those in the hospital at night and weekends. Two of the six current services for AML operate below established NICE recommended levels of activity and the level recommended by the Board, each treating just two and five new patients intensively during 2012/13.

HSCT is a specialised service, providing treatment at a regional level to patients within *London Cancer* boundaries, as well as beyond, from Hertfordshire and Essex. The treatment is very demanding and carries significant risks. HSCT requires a high level of expertise and a complex structure of supporting facilities. There are currently three HSCT centres in the *London Cancer* area closely located together in central London, providing transplants to 310 NHS patients each year.

Clinicians on the *London Cancer* Pathway Board for Haematological Malignancies agree that changes are needed because:

- Current providers are not all meeting the activity levels for acute myeloid leukaemia services recommended in the NICE Improving Outcomes Guidance for Haematological Malignancy (2003)
- One of the three current providers of HSCT is not carrying out the minimum 100 transplants each year, recommended by the London-wide *Model of Care* for Cancer Services (2010).

The clinical teams and trusts with *London Cancer* agree that the best option is to consolidate the three services onto two sites and that increasing the scale of the services on the remaining two sites would bring new opportunities that would benefit patient treatment and services. The future sustainability of the services would be strengthened. Centres with greater volumes can attract and retain high quality specialist staff and deliver better clinical outcomes for patients. Academic research would grow - patients would have access to a greater number of trials and the larger services, working together, would be able to attract international research funding. Finally larger services would be more resilient and better able to withstand the productivity gains expected throughout the NHS.

Each trust within *London Cancer* would continue to have haematologists familiar with the management of cancer during working hours and available out of hours so that new patients with acute myeloid leukaemia can be identified and treated as early as possible. Much of the follow-up care would also be undertaken at local hospitals through arrangements such as outreach clinics, shared care working or joint appointments. Joint appointments would very much support patient continuity of care

A second phase of the review is commencing in the autumn that would focus on broader malignant haematology activity across *London Cancer*.

5.2 Background

5.2.1 *London Cancer*

Representatives of the NHS trusts within *London Cancer* that provide services for the treatment of haematological malignancy are involved in developing these proposals:

- Barnet and Chase Farm Hospitals NHS Trust
- Barts Health NHS Trust
- Barking, Havering and Redbridge University Hospitals NHS Trust
- Homerton University Hospital NHS Foundation Trust
- North Middlesex University Hospital NHS Trust
- Princess Alexandra Hospital NHS Trust
- Royal Free London NHS Foundation Trust
- University College London Hospitals NHS Foundation Trust
- Whittington Health NHS Trust.

5.2.2 **Acute myeloid leukaemia**

Acute myeloid leukaemias are rare aggressive cancers of white blood cells that progress rapidly and require immediate treatment. Acute myeloid leukaemia is classified according to the type of white blood cells that are affected by cancer. There are two main types:

- **Acute myeloid leukaemia (AML)**: which involves myeloid cells, which perform a number of different functions, such as fighting bacterial infections, defending the body against parasites and preventing the spread of tissue damage; and
- **Acute lymphocytic leukaemia (ALL)**, involving lymphocytes, which are mostly used to fight viral infections and generate an immune response. Treatment for this type of leukaemia is already centralised and not specifically addressed in these recommendations.

Younger patients (usually under 70 years) with acute myeloid leukaemia require up to four courses of intensive chemotherapy in order to cure them, or significantly extend their life expectancy. Chemotherapy for acute myeloid leukaemia is particularly demanding. Each course of chemotherapy, given on an inpatient basis, renders the patient neutropenic (without white blood cells) for three to four weeks at a time. During this period because both the disease and the treatment reduce immunity, patients are very vulnerable to infection and other complications. Many of these risks are also experienced by patients undergoing stem cell transplantation. Indeed this period of treatment for acute myeloid leukaemia, often known as “remission induction therapy” is recognised as being more complex and higher risk than some form of stem cell transplantation, which is often considered a more major procedure.

Approximately 15-20% of patients would require admission to intensive care. The risk of dying due to complications for the first course of chemotherapy is in the region of 5% for patients under sixty years of age and 15% for those older than sixty. The risk is less with subsequent cycles. It is clear that this is an intensive, high risk treatment.

Patients with acute myeloid leukaemia therefore need high quality facilities, close supervision and monitoring on a 24-hour basis. Great care has to be taken, both to minimise the risk of infection and

to treat it rapidly and effectively when it occurs. This is best provided by a team of nurses and doctors who are very familiar with the management of such complications. Specialist nursing staff, with the experience to care for patients confidently and know when to call for assistance, and 24-hour medical cover are both essential.

The treatment of acute myeloid leukaemia usually has two phases:

1. Induction phase – described above, where the goal is to kill the leukaemia cells and put the disease into remission
2. Consolidation phase – once there is no sign of the leukaemia, more treatment is given to prevent it coming back. This may involve more chemotherapy or a transplant.

In some patients the acute myeloid leukaemia comes back or resists treatment. When this happens treatment may be repeated, perhaps intensified. It can be very difficult to judge the point at which attempting to cure leukaemia ceases to be in the best interest of the patient. This is an important role of the haemato-oncology multi-disciplinary team, working closely with the patient and their family.

Clinical nurses, psychologists and palliative care specialists have a central role in haemato-oncology teams, ensuring patients and their carers receive multifaceted support, co-ordinated care and the information they want throughout the course of the illness.

Some patients, particularly older patients, would be unable to withstand such intensive therapies and would be treated “non intensively”, usually on a day case or outpatient basis. For these patients, the aim is not to cure the disease but to control it and manage complications such as infections and the need for transfusions as best as possible. The level of support and facilities needed to treat these patients is not as high and generally all of their care can be managed on a more local basis. Services for patients who are being treated “non-intensively” for acute myeloid leukaemia do not form part of this review.

5.2.3 Haematopoietic stem cell transplantation (HSCT)

Haematopoietic stem cell transplantation (HSCT) is the transplantation of stem cells derived from the bone marrow or blood. A stem cell transplant is used to increase the chance of a cure or remission for various haematological cancers and blood disorders. HSCT requires a high level of clinical expertise and appropriate support facilities. This includes haematology medical and nursing staff specialised in management of patients undergoing transplantation as well as support from a range of other clinical specialists including specialists in respiratory medicine, cardiology, microbiology, virology and infectious diseases.

Due to the wide spectrum of complications support is often required from surgical disciplines, including ENT and ophthalmology. Ready availability of intensive care facilities in a unit which is on site and familiar with the management of such patients is essential. Facilities for renal replacement therapy and bronchoscopy should also be readily available and on site. An apheresis service to collect stem cells and staff who can perform bone marrow harvests are another essential requirement. Expert radiology and nuclear medicine opinions should be easily available. Essential specialised laboratory facilities include stem cell processing facilities and access to tissue typing.

There are different types of stem cell transplant:

- Autologous transplant or autograft - where the patient's own haematopoietic stem cells are removed and returned to the patient following high dose chemotherapy or radiation treatment
- Allogeneic transplant or allograft - where the haematopoietic stem cells come from a donor.

From a patient perspective, transplantation is a very intensive treatment. It can take several weeks for the bone marrow to recover, to take up the transplanted stem cells, and to make enough new blood cells. Drugs and blood transfusions are given to speed up this process. During this time patients would need to be in hospital or hospital hotels and be closely monitored for potential complications.

As a general rule autologous transplantation is associated with fewer side effects and shorter stays in hospital as the patient is given cells from his/her own body. However it may be less effective than an allogeneic transplant for treating certain kinds of cancer.

5.2.4 The scope of this review

It has been agreed by the clinical teams and trusts involved, as well as commissioners, that the review of haematological cancer services should be undertaken in two phases.

Phase 1 of the review: this first phase is a review of acute myeloid leukaemia (AML) and HSCT and is being undertaken because:

- current providers are not all meeting the minimum activity levels recommended in the NICE Improving Outcomes Guidance for Haematological Malignancies (2003)
- current providers are not all meeting a key recommendation in the London-wide *Model of Care* for rare cancers and specialist care, which states that:
“Haematopoietic progenitor stem cell transplantation (a type of bone marrow transplant) is currently delivered by eight providers in London. Some of these hospitals are not seeing sufficient patient numbers and therefore should be consolidated to five providers each undertaking a minimum of 100 new cases per year”.

There is a clinical consensus in *London Cancer* that any review should cover both transplantation services and acute myeloid leukaemia, as the facilities and staff involved in delivering HSCT services are often the same as those used to deliver intensive therapy for acute myeloid leukaemia.

It should be noted that all ALL (acute lymphoblastic leukaemia) patients requiring intensive treatment are already referred to the three current regional transplant centres in line with the recommendations British Committee for Standards in Haematology (BCSH) Guidelines on Facilities for the Treatment of Adults with Haematological Malignancies - “*Levels of Care, April 2010*”.

The British Committee for Standards in Haematology Guide for “Levels of Care”

The guidelines are well recognised and define levels of care which reflect the **minimum facilities and resources** to treat patients with haematological malignancies according to:

- the complexity of the treatment delivered
- the duration of anticipated neutropenia following chemotherapy
- in some instances the rarity of the disease sub-type

These are defined as:

- Level 1
- Level 2a
- Level 2b
- Level 3

Although these levels of care are described as distinct entities, provision of care should be flexible so that patients can have access to appropriate components of the service across different levels when necessary. For example, older patients with acute leukaemia on the less intensive treatment described above would receive their treatment at a centre capable of providing Level 2a services; whilst acute myeloid leukaemia patients receiving intensive treatment at a level 2b or 3 service can receive much of their follow up care at Level 2a or Level 1 services, through shared care or outreach arrangements.

Within *London Cancer*, the following levels of care are currently provided at the trusts listed. Phase 1 of the review includes providers with level 2b and level 3 services.

Level 1	Level 2a	Level 2b	Level 3
<i>Homerton Hospital.</i>	<i>Princess Alexandra Hospital.</i>	<i>Barking, Havering and Redbridge University Trust (Queens Hospital).</i>	<i>Barts Health (St Bartholomew's Site).</i>
<i>Barts Health (Royal London Hospital Site).</i>	<i>Whittington Hospital.</i>	<i>North Middlesex University Hospital.</i>	<i>Royal Free Hospital. UCLH.</i>
	<i>Barts Health (Newham General Hospital and Whipps Cross University Hospital Sites).</i>	<i>Barnet Chase Farm Hospitals.</i>	

Phase 2 of the review - the second phase of the review would take place in the next few months and will consider the future configurations of Level 1, 2a and 2b units across *London Cancer*. This will be a broader review of the whole patient pathway for all haematological malignancies and will consider the impact on non-malignant haematological services. Draft terms of reference for this are in Appendix 2 of the pathway specification.⁵⁹

The distinguishing feature for services in the first phase of the review is the higher intensity of treatment given to patients receiving HSCT as well as the majority of patients with acute myeloid leukaemia. Patients fit enough to withstand the treatments will be rendered neutropenic for at least a month at a time, and require a higher level of isolation facilities and a more experienced and available workforce than for the management of other conditions.

The trusts and relevant clinical teams in *London Cancer* have given their support to this two phase approach. It is not considered that any proposals for HSCT and acute myeloid leukaemia arising out of this case for change would impact on the ability of existing Level 2b providers to continue to manage patients with other haematological conditions requiring that level of care, for example, treatments for patients with aggressive histology lymphomas that have relapsed. This review of haemato-oncology services for *London Cancer* can therefore be undertaken in two phases.

⁵⁹ *London Cancer, Pathway specification for haematopoietic stem cell transplantation and acute leukaemia*, 2013.

5.2.5 Principles guiding the review of HSCT and acute myeloid leukaemia services

The principles that have guided members of the *London Cancer* Board, the Pathway Board for Haematological Malignancies and the Technical Group in the development of this case for change are set out in the pathway specification. The Board was guided by the agreed priorities of *London Cancer* and the *London Model of Care*.

In developing the case for change and supporting pathway specification the Haematological Malignancies Pathway Board has taken into account guidance and/or requirements set out in:

- The key recommendations of the Model of Care for Cancer Services in London 2010
- The NICE Improving Outcomes Guidance in Haematological Cancers 2003
- BCSH Guidelines for Facilities for the Treatment of Adults with Haematological Malignancies – Levels of Care 2010
- Manual for Cancer Services – Haemato-Oncology Cancer Measures, National Cancer Peer Review Programme
- FACT – JACIE International Standards for Cellular Therapy Product Collection, Processing and Administration Fifth Edition 2012
- Service Specification for Haematopoietic Adult Stem Cell Transplantation, Specialised Services NHS England 2013.

5.3 Current services

5.3.1 *London Cancer* services

There are currently three transplantation providers within *London Cancer*:

- **St Bartholomew’s Hospital** (Barts Health NHS Trust)
- **The Royal Free Hospital** (Royal Free London NHS Foundation Trust)
- **University College London Hospital** (UCLH NHS Foundation Trust).

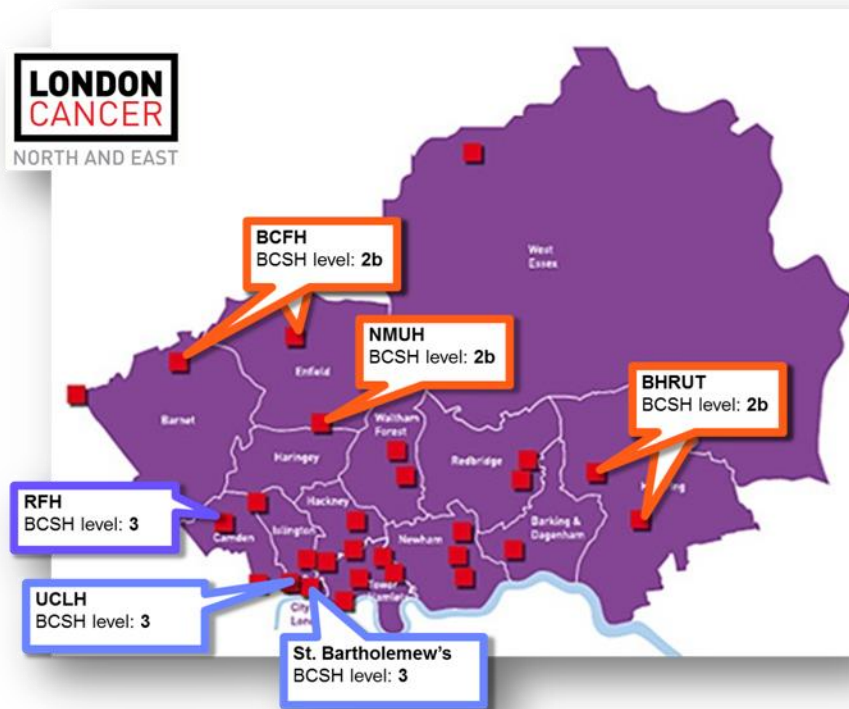
As hospitals providing transplantation services, these three sites are designated ‘Level 3’ according to the ‘Levels of care’ framework devised by the British Committee for Standards in Haematology (BCSH) (2011).⁶⁰

Intensive treatment for acute myeloid leukaemia patients is provided at all the HSCT sites above or at a high-volume ‘Level 2b’ unit. *London Cancer*’s Level 2b units are:

- Barking, Havering and Redbridge University Hospitals NHS Trust, Queen’s Hospital, Romford;
- Barnet and Chase Farm Hospitals NHS Trust
- North Middlesex University Hospital NHS Trust

⁶⁰BCSH. (2009). *Facilities for the Treatment of Adults with Haematological Malignancies – ‘Levels of Care’*.

Figure 1. Location of *London Cancer's* HSCT and AML services (Level 3 and Level 2b centres shown in blue and orange respectively); red markers are the other hospital sites within *London Cancer*.



There are six multi-disciplinary teams (MDT) for haematological cancer services in *London Cancer*:

- Barts Health MDT (covering services at Homerton Hospital, The Royal London Hospital, St Bartholomew's Hospital, Newham General Hospital and Whipps Cross University Hospital)
- Barnet and Chase Farm Hospitals NHS Trust MDT
- Barking, Havering and Redbridge University NHS Trust MDT
- North Middlesex University Hospital NHS Trust and Princess Alexandra Hospital NHS Trust MDT
- University College London Hospitals NHS Foundation Trust and the Whittington Hospital NHS Trust (covering all haematological cancers excluding plasma cell malignancies)
- University College London Hospital NHS Foundation Trust MDT (covering plasma cell malignancies)

All patients with haematological cancer are managed by a haematology MDT, with their case discussed in a formal MDT meeting, attended by members involved in their diagnosis, treatment or care. The MDT is responsible not only for the initial recommendations about what treatment should be offered, but also for delivery of treatment and long term support for patients. Individual clinicians will discuss the MDT recommendations with their patient.

Joint consultant appointments across the hospitals within these MDTs and between MDTs are common. Such appointments help ensure continuity for patients and shared care between higher intensity treatment sites and local outpatient and day unit sites.

Consultants from non-transplant centres routinely join the MDTs undertaking HSCT either in person or via video conference facilities to discuss patients who may require or are undergoing a transplant.

5.3.2 Hospital volumes

(a) New patients with AML treated intensively

Table 3: Total of numbers of new NHS patients diagnosed with AML and the number of patients treated intensively (**in bold**) during 2011/12 and 2012/3

	April 2011 - March 2012		April 2012 - March 2013	
	Number of new patients diagnosed with AML	Number of patients treated intensively	Number of new patients diagnosed with AML	Number of patients treated intensively
BCFH	12	9	14	5
BH	51	30	58	39
BHRUT	34	16	36	9
NMUH	9	5	3	2
RFL	26	15	23	15
UCLH	41	36	45	34
Total	173	111	179	104

Table 3 shows the different levels of activity at the trusts currently treating new patients with AML intensively. Numbers can fluctuate from year to year. In April 2012-March 2013 two trusts, BCFH and NMUH, treated fewer new patients intensively than the minimum recommended level of six patients set out by NICE in 2003.

(b) Transplants

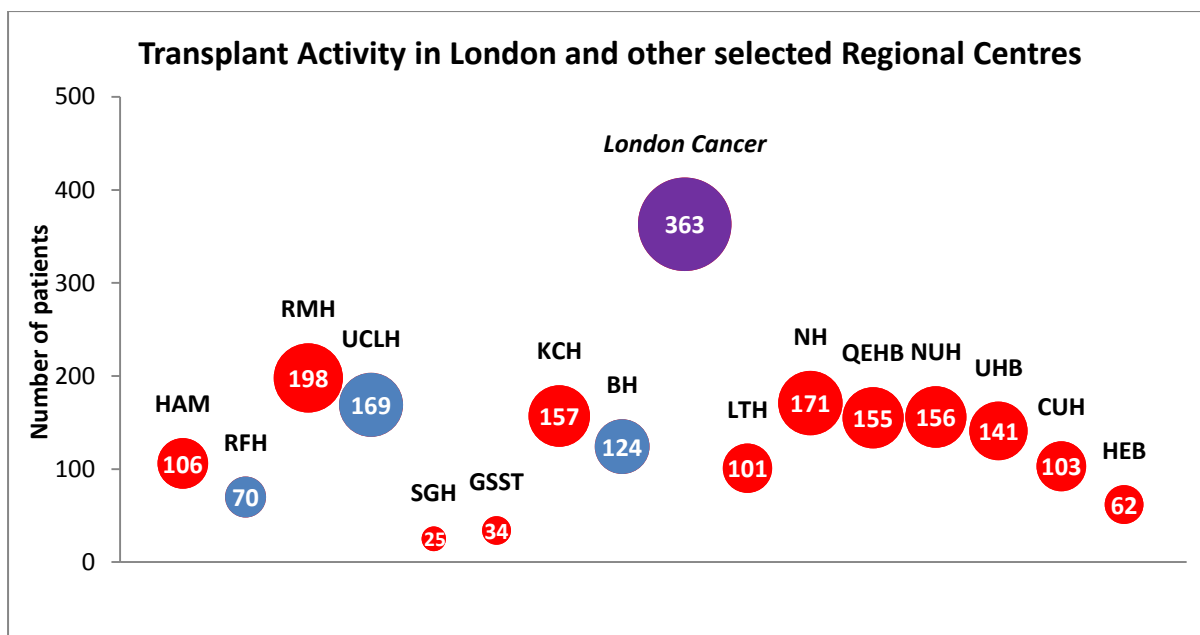
Table 1: Transplants performed on NHS patients at each *London Cancer* HSCT provider site during 2011/1

		BH	RFL	UCLH
Number of NHS bone marrow transplants carried out in ADULTS	Autograft	77	24	85
	Allograft	48	21	55
TOTAL		125	45	140

It should be noted that patients from Hertford and Essex, outside London Cancer, are routinely referred into *London Cancer* Transplant Centres.

This table shows that two of the HSCT centres at BH and UCLH meet the *Model of Care* recommended minimum level of activity of 100 NHS patients. The HSCT centre at RF does not meet the recommended activity level.

Figure 2. Declared transplant activity during 2011 (NHS and private): source BSBMT



HAM: Imperial College Healthcare NHS Trust (Hammersmith site)	London Cancer: BH, RFL, UCLH
RFL: Royal Free London NHS Foundation Trust	LTH: Leeds Teaching Hospitals NHS Trust
RMH: The Royal Marsden NHS Foundation Trust	NH: Newcastle Hospitals NHS Foundation Trust
UCLH: University College London Hospital NHS Foundation Trust	QEHB: Queen Elizabeth University Hospitals Birmingham NHS Foundation Trust
SGH: St George's Healthcare NHS Trust	NUH: Nottingham University Hospitals NHS Trust
GSST: Guy's and St Thomas' NHS Foundation Trust	UHB: University Hospitals Bristol NHS Foundation Trust
KCH: King's College Hospital NHS Foundation Trust	CUH: Cambridge University NHS Foundation
BH: Barts Health NHS Trust (St Barts site)	HEB: Heart of England NHS Foundation Trust (Birmingham)

NB Some Trusts also include children's activity. GOSH activity is not included.

Figure 2 above shows comparative activity (NHS and private) for the eight adult London centres, as well as for selected cities elsewhere in England for 2011. Transplant activity at GSST has since transferred to KCH. It should also be noted that some sites, in particular The Royal Marsden Hospital, include transplant activity for adults and children. The two tables therefore show different activity levels to table 1 for providers within *London Cancer*. However, the Royal Free Hospital has stopped routinely treating private patients on its site since 2011 and 45 transplants now represents its total approximate annual activity level.

Whilst larger than many transplant centres in the UK and internationally, it can be seen that the Royal Free Hospital is not currently meeting the *Model of Care* recommended minimum activity of 100 cases per year and is one of the three smallest centres in London.

Figure 2 shows that there are centres outside London undertaking greater or equivalent levels of transplant activity to London centres.

5.4 Why we need to change

5.4.1 National and London perspective – Acute myeloid leukaemia services

The London-wide *Model of Care* makes no specific reference to AML services, but sets a principle that services should aim to exceed national, regional and local care and quality standards, such as NICE Improving Outcomes Guidance.

The significant mortality associated with the intensive treatment of patients with acute myeloid leukaemia and the need for staff who manage such patients to be familiar with the administration and complications of the relevant protocols, led the Pathway Board in Haematological Malignancies and *London Cancer* to recommend that all centres that wish to continue to treat acute myeloid leukaemia should treat a minimum of 10 new patients intensively with AML on average per year.

The rationale for this number of cases was supported by the overwhelming majority of clinicians on the *London Cancer* Technical Group and confirmed by clinical members of the Pathway Board. It was felt that such a threshold was the absolute minimum that would ensure that each unit sees sufficient numbers of patients with newly diagnosed and relapsed AML requiring intensive therapy at any one time, to maintain the skills and knowledge base of medical and nursing staff, especially those who are working in the hospital at night and weekends.

It is also essential that critical support departments, such as intensive care units are able to gain sufficient experience in the management of AML patients.

The NICE Improving Outcomes Guidance on Haematological Cancers (2003)⁶¹, states that:

“MDTs which manage patients with acute myeloid leukaemia should provide treatment intended to induce remission for sufficient new patients for the units concerned to develop and maintain expertise. Services are unlikely to be viable with five or fewer new patients per year. This treatment should be provided at a single facility within any one hospital site, in designated wards with continuous access to specialist nurses and haematologists.”

Following publication of the NICE Improving Outcomes Guidance 2003, a review of haematological cancer services took place across England to make sure all sites could meet this threshold in the future. However, two services in *London Cancer* are operating below this threshold, with activity levels for patients treated intensively between April 2012 and March 2013 at two cases and five cases each. This situation is not sustainable and newer members of staff in particular will be challenged to develop and maintain their skills, not just on the ward itself, but also in essential supporting services such as intensive care. Clinicians on the Pathway Board agree that since the publication of the NICE Improving Outcomes Guidance for Haematological Cancers the protocols for treating AML have become even more complex. For these reasons they consider services as small as this are not viable and should be treating a minimum of 10 AML cases intensively each year.

Gathering evidence about clinical outcomes when the numbers involved are so low is difficult. Although data has been published which suggests that the outcome of patients with AML treated at smaller centres fare no worse than those at larger centres, these studies are retrospective and are unlikely to have been powered to adequately demonstrate equivalence in outcome.

Limited data from cancer registries in various regions of the UK suggest that some groups of patients with leukaemia treated in specialist centres may survive longer, but this could be due to patient

⁶¹ NICE. (2003). *Improving Outcomes in Haematological Cancers: The Manual*.

selection. Data from Thames Cancer Registry in London shows a highly significant survival advantage for patients with AML treated in teaching hospitals, compared with those treated in non-teaching hospitals, cited in the NICE Improving Outcomes Guidance on Haematological Cancers (2003)⁶².

5.4.2 National and London perspective – Haematopoietic stem cell transplantation

The London wide Case for Change (2010)⁶³ concluded that ‘the high level of expertise and range of facilities required for stem cell transplantation suggests fewer services could manage increased volumes per multidisciplinary team with more effective use of the specialist resource’. The recommendation of the *Model of Care* for Cancer Services (2010) that followed was that there should be a consolidation of HSCT services from eight to five providers in London, with each undertaking a minimum of 100 new cases a year.⁶⁴

These proposals go well beyond the minimum activity levels set out by the Joint Accreditation Committee of International Society for Cellular Therapy and European Group (JACIE) accreditation standards for bone marrow transplantation, which requires transplant centres to perform a minimum of at least ten autografts and/or at least ten allografts a year, or to be a linked satellite centre of an accredited centre. Only JACIE accredited centres are allowed to harvest stem cells and perform transplants. Table 1 in section 5.3.2 illustrates, all three of *London Cancer’s* HSCT units currently exceed JACIE activity standards.

However, one of the guiding principles of the *Model of Care* for Cancer Services, which was strongly supported during public engagement, was that ‘services should aim to exceed national, regional and local care and quality standards, such as NICE Improving Outcomes Guidance, and national policies’.

It is also important to recognise that although the activity levels required by JACIE are not high, the standard JACIE sets for facilities, workforce and other infrastructure are very demanding. Effective use needs to be made of this specialist resource.

5.5 What we need to do

5.5.1 AML services

A key reason for undertaking the review of HSCT and acute myeloid leukaemia together is the close alignment in the management of patients, their complications, the shared staff, expertise and facilities. We as the clinical leaders of the service propose that intensive AML services are provided at HSCT centres and level 2b centres with sufficient activities.

Both proposed HSCT centres would deliver acute myeloid leukaemia services in future. However, the benefits of sustainability described for the HSCT centres would not be realised if a significant core of staff is retained 24/7 to manage AML at the site relinquishing HSCT. It is therefore proposed that services for intensive AML & ALL therapy and HSCT transfer together.

This has the benefit of improved safety due to consolidation, as staff would gain greater experience from the larger number of patients receiving chemotherapy and other treatment.

⁶² NICE. (2003). *Improving Outcomes in Haematological Cancers: The Manual*.

⁶³ *Commissioning Support for London (March 2010), Cancer services: case for change pp.88-89.*

⁶⁴ *Commissioning Support for London (August 2010), a Model of care for cancer services: Clinical paper p.93.*

We recommend that AML services are only provided at HSCT centres and at level 2b services with providers treating a minimum of 10 new patients with AML intensively, on average per year.

Currently activity within *London Cancer* is sufficient to support one such level 2b units if activity is pooled at sites with low patient numbers and transport arrangements make this a sensible solution. This has the following benefits:

- Greater accessibility to AML services for parts of the local population
- Potentially higher numbers would provide more opportunities for staff to develop and maintain their expertise
- Greater sustainability of service and a more even workload
- Shared consultant posts with neighbouring Trusts with level 2a level facility
- Developing opportunities for other shared posts, for example pharmacists, dieticians, physiotherapists.

We strongly believe that ‘no change’ is not an option as there are services that are currently operating at activity levels below those recommended in the NICE Improving Outcomes Guidance 2003.

5.5.2 Haematopoietic stem cell transplant services

As a clinical community, the Pathway Board for Haematological Malignancies and its supporting Technical Group are all agreed that the recommendation in the *Model of Care* seems entirely appropriate given the complexity of HSCT and the involvement of multiple healthcare personnel, as it is essential that sufficient procedures are undertaken to ensure expertise is maintained throughout the entire service. Their view is that there does not appear to be any good reason for distributing adult transplant activity across eight centres in London. The three services located within *London Cancer* are located very closely together.

However, it should be noted that whilst there is a significant body of evidence that establishes a relationship between the volumes of procedures carried out by a centre and an improved clinical outcome for patients, this finding has not been demonstrated to apply in the haemato-oncology context. For example, the British Society of Blood and Marrow Transplantation (BSBMT) 2010 data showed no evidence that centres transplanting more than 50 autografts or more than 30 allografts per annum have an outcome better than smaller centres.⁶⁵

5.5.3 Key reasons why *London Cancer* supports changes to the way HSCT services are delivered across London

Ensuring the future sustainability of services - centres with greater volumes are better able to attract and retain high quality specialist staff and plan for the future. This is particularly important in London where such staff are mobile, and have the choice of several units they could potentially work in. Figure 2 in section 5.3.2 demonstrates that there are also regional centres of a significant size, where the cost of living for staff would be much lower than in London. Larger services can provide more consistent workloads, a stronger training and developmental environment and the necessary range of core staff roles in depth, able to cover annual leave and sickness. This isn't only for medical and nursing staff, but for pharmacists, dieticians, physiotherapists, specialist laboratory staff and a wide range of other professionals.

⁶⁵ BSBMT. (2012). *3rd BSBMT Report to commissioners*. pp-78-82.

Achieving academic research benefits - the higher volume of patients going through a larger transplantation centre should enable it to deliver larger clinical trials and in so doing position itself more competitively on the international research stage and make itself more attractive to research funders. This in turn makes transplant centres more able to attract staff. The case for academic research benefits of centralisation is strong; however no formal work has been carried out with regard to haemato-oncology. Although all three of *London Cancer's* HSCT centres have made valuable contributions to clinically based research in the last few years, the view is held that no centre is currently big enough, on its own, to match the activity and recruitment to clinical trials achieved by the larger transplant units in North America and elsewhere.

Delivering productivity and cost-efficiency - an independent expert commissioned by *London Cancer* on HSCT services concluded that there are savings to be made, although of a relatively limited nature, from having more patients at fewer sites. The limited nature of these savings is because above a certain size (an estimated 50 cases per year) the costs of transplantation are largely related to the number of procedures performed. However, it is well understood that in the current financial climate the NHS has to make year on year efficiency savings so that these can be available for reinvestment in new and additional activity, allowing as many patients as possible to benefit and to enable the NHS to respond to new technologies. Transplant services are an area where activity has been growing annually. A more sustainable service, that doesn't require the use of agency staff and can attract funding into research trials, is more likely to be able to withstand the productivity requirements each year.

Improving clinical outcomes for patients - a sustainable and developmental environment for staff, that is strong in research and cost effective, would provide a more conducive platform for HSCT centres to continue to drive improvements in clinical outcomes for patients.

Why we support two HSCT centres for *London Cancer*

- Meets the minimum volumes set out in the key recommendations
- Greater sub-specialisation in the rarer cancers than is possible at present, but each site may need to agree sub-specialist interest areas to maximise this
- Sustainability – greater opportunities for workforce, education and training across all transplant indications than at present
- Cost-effectiveness – greater potential to maximise this and deliver productivity gains than at present
- Access – choice of travel into London Rail Stations maintained, particularly for patients travelling from outside the boundaries of *London Cancer*
- Deliverability – much more feasible than the one centre option with less capital investment; would not imbalance activity of host trust.

5.6 What this means for patients

5.6.1 Patients with acute myeloid leukaemia

- Patients can continue to expect that each trust within the boundaries of *London Cancer* would have haematologists familiar with the management of cancer on site during working hours and available out-of-hours so that their condition can be picked up early. This is in recognition that patients with acute myeloid leukaemia present through emergency departments, GP referral to outpatients and from the wards via other medical or surgical teams. Early identification would result in more rapid diagnosis and treatment
- Patients with acute myeloid leukaemia who are assessed as too frail to withstand intensive treatment would have access to an expert multidisciplinary opinion around their treatment plan. Their treatment can be provided in local, level 2a hospitals with specialist haemato-oncology trained staff in day units providing chemotherapy infusions and blood transfusions. Specific haematology beds are available on site if admission is required
- Patients with AML who are to be treated intensively would be cared for in a unit that is managing on average a minimum of ten new patients intensively each year as well as patients who have relapsed. There would be 24/7 support from specialist trained nursing staff on the ward and access to a consultant haematologist 24/7. Treatment would be given in an en-suite isolation room, on a ward designated for haematology patients. Relatives and others would be able to stay overnight
- There would be joint appointments between this service and local hospitals to provide continuity of care
- Between treatments patients would have a clear plan about when to call for support, including when it is right to access local services and when a return to the specialist unit is better. There would be immediate access back to the specialist service 24/7 if required. Patients would have rehearsed with their clinical teams what to do under these circumstances
- Some patients may have further to travel to an expert centre than at present if their local service is treating very low numbers of AL patients, or if their service ceases to undertake transplants. Transport plans would be discussed individually with patients.

5.6.2 Patients needing HSCT

- At the end of the induction phase there would be a consultation with the patient, following an MDT discussion about further treatment options. This may involve an allogeneic transplant, or further treatment at their current specialist inpatient service.
- If the current specialist service is not a transplant centre, and a transplant is indicated, the patient would need to travel to a new centre for treatment. There would be joint appointments between their current service and the HSCT centre to help ensure continuity of care. Patients receiving allografts are entitled to patient transport for 12 weeks after discharge; patients receiving autografts are provided with transport on discharge, and subsequently if they are medically unfit to travel by other means.
- Some patients from outside *London Cancer*, where there are no regional centres, would be travelling significant distances. Local referring consultants may have linked appointments with the HSCT centre, or may join MDT discussions via video-conference facilities, to support continuity of care. Shared care arrangements are possible
- Throughout their treatment patients would have access to a named clinical nurse specialist who would provide support and liaise with others including local or more specialist services. A full assessment of the patients' and their carers' needs would be undertaken at key stages during treatment

- Access to specialist palliative care services , psychological or spiritual support, would also be available
- At the end of treatment patients would be given a clear treatment plan, in a dedicated appointment to explain it. There may be long term annual outpatient follow up at the HSCT for anticipated “late effects” or longer term consequences of treatment. For others routine outpatient appointments would reduce in frequency. Many appointments would be held in local hospitals through outreach and shared care arrangements. GPs would be asked to manage patients who are discharged according to a clear end of treatment summary, with supported follow up in the community if necessary. If annual recall, for example for blood tests, is required primary care would have robust systems to ensure this takes place.
- GPs and patients would have clear guidance about when referral back to secondary care is necessary.

5.6.3 Impact on patients during the transition of services

Should these proposals be agreed, there would be detailed individual discussions with patients about the relocation of their treatment to allay understandable anxieties. Through the creation of joint consultant appointments between hospitals, patients would continue to be looked after by the same teams of consultants and specialist nurse.

Patients would have an opportunity to familiarise themselves in advance with their new facility and transport arrangements and other support would be discussed. GPs and local community services would be kept fully informed of any changes, including contact details, emergency numbers, referral arrangements etc.

Consolidating established HSCT services with their complex clinical infrastructures and support services and strong academic activities and output would require detailed planning, including consideration of the impact of any changes on existing non-malignant haematology services provided on the current sites. We, as local experts in this field, would work together to ensure this is done safely and thoroughly.

5.7 The *London Cancer* Board recommendation to commissioners for acute myeloid leukaemia services and haematopoietic stem cell transplantation

The *London Cancer* Board supported the Haematology Cancer Pathway Board in its plans to develop an ambitious specification for the intensive treatment of AML at the same time as reviewing the stem cell transplantation centres, as these two specialist treatments are very intensive and often linked. The Board also supported this being the first part of a two stage process, recognising the potential to improve ‘shared care’ along the patient pathway for all forms of haematological malignancy requiring input from intensive therapy centres, and the additional time needed to understand the impact of anticipated future changes in acute providers in North Central London.

Two applications were received from BH and UCLH to provide a haematopoietic stem cell transplant centre and level 3 (intensive) malignant haematology services for our population. The RFL chose not to submit an application to continue to provide this level of intensive treatment but did submit an application to provide level 1 (out-patient only) malignant haematology services. A further two applications were received from BHRUT and BCF to provide intensive therapy for younger patients with AML, as part of their level 2b malignant haematology services. These applications were considered by the *London Cancer* Board on 7 August 2013.

For haematopoietic stem cell transplantation, the *London Cancer* Board concluded that it was satisfied to recommend to commissioners that there should be two centres for the *London Cancer* population, based at BH and UCLH, based on the following considerations:

- Both centres have long established transplant practices that meet all national standards and have outcome measures that meet or exceed the national average.
- Both centres have successful research programmes, essential in this rapidly evolving field, and are increasingly working more closely together.
- There is a clear plan and Board-level commitment by UCLH to ensure a seamless transition for the service at the Royal Free, ensuring quality of patient care and retention of specialist staff.
- Both centres have the expertise and capacity to continue to provide intensive therapy for acute leukaemias (ALL and AML) as part of their level 3 services.

For intensive therapy of AML based at level 2b units, the *London Cancer* Board accepted the clinical advice of the Haematology technical subgroup that we should set a threshold of a minimum of 10 patients a year being treated intensively for AML in order for the skill and experience of a unit to be sustainable. On this basis, we recommend to commissioners that only BHRUT should be commissioned for the future provision of intensive AML therapy as part of level 2b haematology services. However, we have emphasised to all trusts who applied that we expect them to play an active role in the elaboration of support more locally for patients on intensive treatment pathways and to further develop and strengthen partnership working with the proposed intensive treatment centres. We recognise that other options may emerge during the second phase of our clinically-led review of the entirety of malignant haematological services across our system.

5.8 The expected benefits for patients

The expected benefits of the proposals are:

- HSCT specialists have access to the most up-to-date equipment and are supported by an expert team containing all of the right types of highly-skilled staff.
- As well as specialist provision for HSCT, the specialist centres would be able to deliver the most up-to-date radiotherapy, chemotherapy and targeted therapies. Shared/standardised methods would be based on best practice across the clinical teams.
- The future sustainability of the services would be strengthened. Centres with larger volumes are better able to attract and retain national and international clinical staff and offer higher quality clinical training to junior doctors and other health professionals.
- Academic research would grow. Patients would have access to a greater number of trials and earlier access to newer therapies. Working together, the two HSCT centres would be able to attract international research funding.
- Services would be more resilient and better able to withstand the productivity gains expected throughout the NHS. Only through greater productivity would it be possible to invest in additional patient activity, new technologies and treatments.
- Patient safety would benefit from consolidation of services. Staff would gain greater experience from the larger number of patients receiving chemotherapy and other treatments.
- The introduction of more joint working arrangements across sites, such as joint consultant appointments, outreach and shared care arrangements, can deliver expert care and follow

up closer to where many patients live, both during and after treatment. Such arrangements would also provide better continuity of care to patients.

6 Oesophago-gastric cancer

6.1 Summary

Based on national figures for the incidence of gastric and oesophageal cancer in the UK, 830 new cases will be seen annually in the *London Cancer* region. Of these cases, around 150 oesophago-gastric resections are performed each year.

In developing the oesophago-gastric (OG) case for change we are building on the already excellent outcomes for OG cancer patients from the current providers. However, there is evidence from across cancer surgery and OG cancer in particular that the larger the surgical centre, the better the outcomes. We also recognise the need to develop a service that meets the future needs of our population.

Our aim is to continue to provide local services where possible, including urgent referrals, diagnostics, and long-term follow-up clinics with improvements to current practice including reducing the length of time from referral to first appointment to five working days. Similarly, diagnostic requests would be reported within five days of request. Rapid diagnostic clinics with dedicated OG specialists would be run at several centres throughout the system. A multidisciplinary follow-up clinic with surgeons, oncologists, CNS and dietetics would be available for patients close to home.

The clinicians at *London Cancer* believe that patients requiring more specialist services should be treated at specialist centres by a skilled multidisciplinary team including surgeons, oncologists, radiologists, nurses and dieticians who together would support patients in their pathway.

Specialist surgery currently undertaken at three sites would be reduced to two and then work towards location into one centre. This would increase the number of procedures that individual surgeons perform and this is expected to improve surgical outcomes, reduce length of stay and improve patient experience. There would also be huge benefits with a concentration of expertise allowing for greater research and trial participation.

Advanced radiotherapy techniques such as IMRT would be available to all appropriate patients at centres across *London Cancer*. There is already a strong collaborative approach amongst the clinical community which would continue to foster improvements to outcomes, patient experience and trial participation for our patients.

6.2 Background

6.2.1 *London Cancer*

As the clinicians treating patients with oesophago-gastric cancer locally, we have welcomed the opportunity through the *London Cancer* integrated system to propose our vision for improvement in care and research for this pathway. Representatives of the NHS trusts within *London Cancer* that provide oesophago-gastric cancer services have been members of the OG Cancer Pathway Board and are involved in developing these proposals:

- Barnet and Chase Farm Hospitals NHS Trust
- Barts Health NHS Trust

- Barking, Havering and Redbridge University Hospitals NHS Trust
- Homerton University Hospital NHS Foundation Trust
- North Middlesex University Hospital NHS Trust
- Princess Alexandra Hospital NHS Trust
- Royal Free London NHS Foundation Trust
- University College London Hospitals NHS Foundation Trust
- Whittington Health NHS Trust.

6.2.2 Oesophago-gastric cancer

Oesophago-gastric (OG) cancer refers to cancer of the stomach and cancer of the oesophagus. It is the fifth most common cancer (and fourth most common cause of cancer death) in the United Kingdom, affecting around 13,500 people each year.^{66,67} In common with many Western countries, the incidence is increasing, particularly adenocarcinomas of the lower oesophagus and gastro-oesophageal junction.⁶⁸ The prognosis for most patients diagnosed with oesophago-gastric cancer remains poor, with overall 5-year survival rates in England and Wales being approximately 7% for oesophageal and 13% for gastric cancer.

The two main types of oesophageal cancer, which account for 72% of oesophageal cancers develop in the lining the oesophagus. There are several types of gastric cancer but approximately 95% of them start in the glandular cells of the stomach lining. The diagnosis and management of patients with OG cancers involves a number of professional groups including GPs, specialist OG surgeons, clinical nurse specialists, dieticians, radiologists and physiotherapists.

We can define the “specialist” areas of OG cancer care as:

- Endoscopic therapies
- All surgery, whether curative or palliative
- Chemotherapy, radiotherapy and brachytherapy to be delivered by the specialist team but for the site of delivery to be determined by the network guidelines

Surgical resection offers the chance of long-term survival for selected patients with early stage OG cancer. These operations should be undertaken in a centre where the surgical team carries out a minimum of 60 oesophageal and gastric resections per year. The Association of Upper Gastrointestinal Surgeons (AUGIS) recommends that an individual specialist surgeon should undertake a minimum of 15 to 20 resections per year, working within centres comprising 4-6 surgeons. It is worth noting that majority of OG cancer patients suitable for surgery requires multi-modality treatments, usually surgery in conjunction with chemotherapy.

About 75% of patients with OG cancer have inoperable disease and require palliative and non-surgical treatment such as chemotherapy, radiotherapy or endoscopic intervention to relieve symptoms. Specialist MDTs are required to make the treatment decision for this group of patients, but the actual treatments may be provided in local units according to network clinical guidelines.

⁶⁶ Cancer Research UK, 2011.

⁶⁷ Office of National Statistics, 2010.

⁶⁸ GOJ - Newham et al 2003

6.3 Current services

6.3.1 London Cancer services configuration

We currently have three specialist centres for OG surgery within *London Cancer*:

- **University College London Hospital** (UCLH NHS Foundation Trust)
- **The Royal London Hospital** (Barts Health NHS Trust); and
- **Queens Hospital** (Barking, Havering and Redbridge University Hospitals NHS Trust)

These Trusts work in partnership with their local hospitals to manage the diagnosis and treatment of patients through multi-disciplinary team (MDT) meetings that involve the participation of clinicians specialised in OG surgery, oncology, pathology and radiology as well as nursing and dietetics.

6.3.2 Other services

There are numerous other providers of OG cancer surgery local to *London Cancer*, these include Imperial College Healthcare NHS Trust – St Mary’s Hospital, Guy’s and St Thomas’ Hospitals NHS Foundation Trust, Royal Marsden NHS Foundation Trust – Chelsea. We recognise that patients from across our population may wish to access services outside the capital, and we support this on an individual basis. West Hertfordshire Hospitals NHS Trust – Watford General Hospital is also a provider, and patients living in North Essex have the option of receiving their specialist treatment at Addenbrookes Hospital (Cambridge). Those patients in central or East Essex have the option of Mid-Essex Hospital (Broomfield Hospital, Chelmsford) for their specialist treatment.

6.3.3 Hospital volumes – current figures

Based on national figures for the incidence of gastric and oesophageal cancer in the UK, 830 new patients are likely to be diagnosed in the *London Cancer* area each year.

With current resection rates of around 20 per cent (10 per cent for oesophagus and 24 per cent for OG junction and stomach), approximately 170 oesophageal and gastric resections will need to be performed every year; for our population currently around 150 resections are performed between Barts Health (at the Royal London site), UCLH and Queens in Romford.

We are pleased that improvements in preoperative staging, mainly related to PET-CT have led to a reduction in resection rates. This is balanced by an increasing incidence of oesophageal and OG junction tumours, along with improved public awareness that in turn might lead to earlier diagnosis.

CENTRE	OESOPHA- GECTOMY	GASTREC- TOMY	LOCAL EXCISION / PALLIATIVE OPERATIONS	TOTAL NUMBER OF PROCEDURES	POPULATION	30 DAY MORTALITY
Barts Health	18	30	6	54	1,120,000	0
UCLH	22	15	4	41	1,350,200	0
Barking Havering and Redbridge University Hospitals	32	12	9	53	750,000	0

Source: Local audit.

The figures above show the number of oesophagectomies and gastrectomies carried out at the 3 Trusts providing specialist OG surgery in London cancer over a period of 12 months from January 2012 to December 2012.

6.4 Why we need to change

6.4.1 National perspective

To us as a clinical body, it is clear that whilst there have been significant improvements in cancer care in the UK over the past decade, there is further improvement needed to deliver world-class cancer services. While deaths from cancer have fallen, the UK still has a relatively high mortality rate. As cancer surgeons, we are well aware that national and international evidence demonstrates a clear link between higher surgical volumes and better patient outcomes. Specialist centres which have frequently practising specialist teams and full facilities, with high patient throughput, generally have better patient outcomes.

In 2001, the National Institute for Health and Clinical Excellence (NICE) published guidance on improving services for OG cancers. The guidance recommended that patients with cancers that are less common or need complex treatment should be managed by specialist multidisciplinary teams in large hospitals or cancer centres.

6.4.2 London and local perspective

Given that we know from many pieces of evidence cited earlier in this document larger centres can have much better outcomes, clinicians in the capital have been keen to see larger OG cancer practices develop, and actively engaged in developing strategies with commissioners to move towards this approach. The NHS body responsible for the whole of London at the time reviewed cancer services in the capital in 2009/10. The review included an engagement process with key stakeholders and patient groups from across London and made a compelling argument for the need to improve cancer services in London. The review showed that access to and outcomes from cancer care were unequal across the city and that mortality rates from cancer were higher in London than the rest of the UK.

Londoners report a poorer experience of cancer services than other areas of England, and services are not always organised to deliver the best outcomes for patients. This is borne out in the reported experience of OG cancer patients, which is a great concern for us as clinical leaders. Despite having the highest population density, London has one of the smallest average catchment populations per hospital for all services. This means that hospitals in London are not able to take full advantage of the advances in medical care and economies of scale as specialist staff, facilities, and patients are spread across a relatively large number of hospitals.

This London-wide review made wide-ranging proposals for increasing early diagnosis, improving hospital care and taking a new approach to patients living with cancer. The proposals said that common treatments should be available locally to patients, but that specialist surgery should be concentrated to improve quality and sustainability.

The review showed that there was evidence that specialist hospitals and surgeons that treat more OG cancer patients achieve better outcomes for high-risk surgical procedures and recommended that minimum thresholds for surgery be set.

6.5 What we need to do

As experts in cancer surgery, we understand there is clear evidence that surgeons performing high volumes of OG surgery have better patient outcomes and that all patients benefit from being looked after by a 'high volume' team, even if they don't have surgery.⁶⁹ Clinicians across North East London, North Central London and West Essex believe a more ambitious approach is required to deliver the world-class services that our populations deserve. Therefore, we believe consolidating complex surgery in fewer specialist centres would provide the best outcomes for all our patients.

As clinical leaders for this service, and with an ambition to deliver only the very best outcomes for patients, we propose a reduction in the number of specialist OG cancer centres in the *London Cancer area*.

The number of MDTs would be reduced from three to two, and then to one, with a concentration of expertise allowing for greater research and trial participation. Specialist surgery currently undertaken at three sites would be located in two centres initially, but ultimately working towards a single centre in central London. Centralisation would aim to further improve surgical outcomes, reduce length of stay and improve patient experience. There is already a strong collaborative approach, which would continue to foster improvements to outcomes, patient experience and trial participation for our patients.

Concentrating services would enable our surgeons to have access to the most up-to-date equipment and receive appropriate support from an expert team of health professionals from other disciplines. The specialist centres would also be able to deliver the most up-to-date radiotherapy and chemotherapy for OG cancer. In addition, this would enable sharing and standardisation of best practice for oesophago-gastric cancer across all subspecialties.

Another of the expected benefits of an integrated cancer system would be an improvement in the OG patient pathway across the whole of the North Central and North East London/West Essex area, the result of which would improve communication between local and specialist hospitals. Another benefit would be the sharing of best practice between clinicians, nursing and allied health professionals resulting in a more unified experience for patients and their relatives.

6.6 The *London Cancer Board* recommendation to commissioners for oesophagus and gastric cancer surgical services

The *London Cancer Board* recommendation to commissioners for Oesophagus and Gastric cancer surgical services

In developing the *London Cancer* service specification for the oesophago-gastric cancer pathway, the OG technical subgroup was unable to reach a consensus on the optimum number of specialist surgical centres to provide this complex procedure for our patients. The *London Cancer Board* therefore sought external expert clinical advice, which was incorporated into the final specification. The external expert advice made a strong argument that aiming for a single centre with high volumes and therefore the ability to run a completely dedicated complex surgical rota round the clock would be optimal for patients and staff efficiency. However, they also noted that a two centre

⁶⁹ Coupland VH *et al.* Hospital volume, proportion resected and mortality from oesophageal and gastric cancer: a population-based study in England, 2004-2008. *Gut*, 2013.

model could be made to work, but emphasised that it must be developed as a single integrated service working to common protocols, audit, staff training and research.

The specification against which applications were invited therefore put the onus on the applicant trusts to demonstrate how they would meet an exacting quality standard of a minimum of 4 specialist OG surgeons on a dedicated rota, with each performing a minimum of 15-20 cases per year. Trusts were also asked to define their referral population to ensure they cared for a sufficient number of patients to maintain the expertise of the whole surgical team.

The *London Cancer* Board received three applications to provide specialist OG cancer surgery, from BH, BHRUT and UCLH. The Board therefore sought further external expert advice from a panel which heard presentations from all three trusts and reviewed their written applications. The panel report, together with the trust applications, was considered by the *London Cancer* Board on 3 July 2013.

The independent expert panel's recommendations for specialist OG surgery were clear that we should reduce from 3 sites to 2 sites as soon as possible, in order that all patients could be served by services meeting national guidance. They further advised that on the basis of likely numbers of patients requiring surgery in the future, we should plan to further consolidate surgery into a single centre in due course. The panel felt that if a move to a single centre was to be adopted then this could be best provided by UCLH. The panel favoured a transitional move to two centres that could be achieved immediately with no need for major changes in infrastructure or associated services. They suggested that this transitional two centre arrangement should be based at UCLH and BHRUT.

It took some time and further discussions between the external experts and the applicant trusts to achieve clinical support to accept the conclusions of the external panel. However, by September 2013, the *London Cancer* Board felt that good progress had been made in discussions between the clinicians and trust medical directors. They now accepted that the external panel's recommendation of UCLH as the destination for a staged approach to creating a single OG surgical centre for *London Cancer* is based on UCLH's overall vision for OG cancer management and its commitment to leadership of the change. On this basis, the *London Cancer* Board has communicated to commissioners that there is clinical support for the recommendations of the expert panel which has been accepted by all concerned.

6.7 The expected benefits for patients

Clinicians are united in the view that services need to change. The expected benefits from the proposed change are:

- Improvements in outcomes for patients having specialist surgery for OG cancers, both in the short and longer-term, including reduced complications and an opportunity to have greater information about mortality and longer-term outcomes. A critical mass of OG cancer patients would mean that each surgeon carries out enough operations each year as recommended by AUGIS and to continuously improve.
- Surgeons have access to the most up-to-date equipment and are supported consistently by an expert team containing all of the right types of highly-skilled staff who work together all the time and know all patients with the disease well.
- As well as specialist surgery, the specialist centres would be able to deliver the most up-to-date radiotherapy and chemotherapy. Shared/standardised methods would be based on best practice across the clinical teams.

- This would support us as clinicians to deliver services which are more productive and efficient through the minimisation of duplication and waste, in particular, to address the inefficient use of consultant time due to supporting a multi-site OG surgical service.
- Patients experience a better co-ordinated pathway of care as doctors would work jointly in both the specialist and local units.
- The service is able to better attract national and international clinical staff to work in the specialty and offer higher quality clinical training to junior doctors and other health professionals. This would not only help patients in the short-term, but help to build the capability and strengths of the service for future generations.

6.8 The impact on patients

For the majority of patients diagnosed with OG cancer, there would be little impact as patients would continue to be diagnosed and where possible receive their outpatient treatment and follow-up locally.

For patients who live locally to one of the three current specialist centres there may be a need to travel further for definitive surgery, as the number of centres is reduced. As those treating this disease, we are aware that patients with OG cancer can be very ill and coping with severe symptoms and consequences of treatment, so travel would be planned appropriately and carefully, and only when necessary.

One of the expected benefits of an integrated cancer system would be an improvement in the OG patient pathway across the whole of the North Central and North East London/West Essex area, the result of which would improve communication between local and specialist hospitals. Another benefit would be the sharing of best practice between clinicians, nursing and allied health professionals resulting in a more unified experience for patients and their relatives.

7 Next steps

Together as clinicians we have worked with colleagues across our local hospitals and with primary and community clinicians and patient representatives to develop our recommendations for change.

We believe that consolidating specialist surgery and treatment for rare and complex cancers into fewer, higher volume, centres will improve clinical outcomes for our patients. We have carefully set out in our pathway specifications what is required to deliver excellent, world class specialist cancer care. As well as excellent care in specialist centres of expertise we recognise the importance of local access and shared care across the pathway to improve experience for patients and minimise additional travel time. Our specifications set out in detail which elements of care should be provided locally and how the specialist centres would be expected to support this.

We have taken advice from external clinicians to ensure our recommendations are truly in the best interests of our patients. We have worked hard to build as much consensus as possible across our clinical community as to the best way to develop specialist cancer services in the *London Cancer* region.

We have now provided our recommendations to NHS England as the commissioner of specialist cancer care for our residents. We will now be working alongside NHS England as it leads a wider engagement process on our recommendations for change. We are keen to understand the views of wider stakeholders and will be working with NHS England as it finalises recommendations for change following this engagement process. An NHS England-led decision making process will make final decisions on any changes to services, with *London Cancer* taking a lead role on planning for implementation and ensuring that any changes made deliver improved patient outcomes and experience.

8 Glossary

8.1 Brain tumours

Computerised tomography (CT) scan

An investigation that uses x-rays and a computer to create detailed images of the inside of the body.

Craniotomy

A surgical incision or opening into the skull.

Glioma

A cancer of the brain that begins in glial cells (cells that surround and support nerve cells). A 'high-grade' glioma is one that grows rapidly and has an aggressive behaviour.

Intracranial

Being or occurring within the cranium (skull).

Intraoperative

Relating to the period during a surgical procedure.

Neuro-rehabilitation

Rehabilitation that concentrates on improving physical and cognitive or understanding impairment resulting from damage to the nervous system.

Neuro-oncology

The branch of medical science dealing with tumours of the nervous system.

Neuropathology

The study of disease processes in the nervous system.

Neurosurgery

Surgery on any part of the nervous system.

8.2 Urology

Brachytherapy

A type of internal radiotherapy, which involves putting a solid radioactive material close to, or inside, the tumour.

Dialysis

A form of treatment in which a machine replicates many of the kidney's functions.

Interventional radiology

Techniques that rely on the use of x-ray images to guide treatment.

Molecular pathology

Use of molecular and genetic approaches to identify and classify tumours through examining molecules within organs, tissues or bodily fluids.

Multidisciplinary team

A group of doctors, nurses and others with expertise in a specific cancer, who together, discuss and manage an individual patient's care at diagnosis and other times.

Renal medicine

The medical specialty dealing with kidney function and diseases.

Targeted therapies

Drugs or other substances that block the growth and spread of cancer by interfering with specific molecules involved in tumour growth and progression.

Tissue banking

Live tissue taken from tumours during surgery, for the purposes of medical research and education.

Urology

The medical specialty concerned with the urinary system in males and females and the reproductive system in males.

Vascular surgery

The surgical specialty concerned with the blood vessels.

8.3 Head and neck cancer

Adenocarcinoma

Adenocarcinomas are cancerous growths of glandular tissue.

Areca or betel nut

Fruit of the tropical palm Areca catechu. It forms the basis of a number of chewed products and is commonly mixed with slaked lime and a variety of other ingredients and flavourings according to local practices; tobacco may also be added. In paan small pieces of areca nut are mixed with lime and wrapped in a betel leaf (leaf of the betel vine); tobacco may also be added.

Atraumatic extraction

Removal of (in this case) teeth with the minimum amount of trauma.

Audit

A method by which those involved in providing services assess the quality of care. Results of a process or intervention are assessed, compared with a pre-existing standard, changed where necessary, then reassessed.

Betel nut

See Areca nut.

Biopsy

Removal of a sample of tissue or cells from the body to assist in diagnosis of a disease.

Brachytherapy

Radiotherapy delivered within an organ.

Cervical lymphadenopathy

Disease or swelling of the lymph nodes in the neck.

Chemoradiation

Treatment that combines chemotherapy and radiotherapy.

Chemotherapy

The use of drugs that kill cancer cells, or prevent or slow their growth.

Clinical oncologist

A doctor who specialises in the treatment of cancer patients, particularly through the use of radiotherapy, but may also use chemotherapy.

Computed tomography (CT)

An X-ray imaging technique.

Cytologist

A person who specialises in the study of the appearance of individual cells under a microscope.

Cytology

The study of the appearance of individual cells under a microscope.

Cytopathologist

A person who specialises in diagnosis through detecting and identifying disease in individual cells.

Cytopathology

A branch of pathology that deals with disease at the cellular level.

Dysphagia

Difficulty with swallowing.

Electrolarynx

A battery operated device which may be used to help laryngectomees speak.

Endocrine: Having to do with glandular tissues that secrete hormones directly into the bloodstream.

Endocrinologist

A doctor who specialises in treating diseases of the endocrine system.

Endoscope

A tubular device with a light at the end that transmits images to aid diagnosis or therapy. It may also be used to take samples of tissues (biopsy).

Endoscopy

Examination of the interior of the body using an endoscope.

Epithelial cells

Cells which form a membrane-like tissue that lines internal and external surfaces of the body including organs, vessels and other small cavities.

Fine needle aspiration cytology (FNAC)

A fine needle is inserted into tissue to withdraw cells which are then examined for the presence of cancer cells.

Flap

A tissue graft. A reconstructive technique where areas of fat, muscle or skin are moved from one area of the body to another.

Follicular thyroid cancer

See thyroid cancer.

Goitre

An enlargement of the thyroid gland that is commonly visible as a swelling at the front of the neck.

Grade

Degree of malignancy of a tumour, usually judged from its histological features.

Gutkha

A form of chewing tobacco.

Histopathologist

A person who specialises in the diagnosis of disease through study of the microscopic structure of tissue.

Histopathology

The study of microscopic changes in diseased tissues.

Hospice

A place or service that provides specialist palliative care for patients with progressive, advanced disease.

Human papillomavirus

A virus that causes warts and is often associated with some types of cancer.

Laryngectomee

A person who has had their larynx removed.

Laryngectomy

Surgical removal of the larynx. A partial laryngectomy is where only part of the larynx is removed.

Lymph nodes

Small organs which act as filters in the lymphatic system.

Magnetic resonance imaging (MRI)

A non-invasive method of imaging which allows the form and metabolism of tissues and organs to be visualised (also known as nuclear magnetic resonance).

Maxillofacial

Having to do with the jaws and face.

Nasopharynx

The upper part of the pharynx behind the nose.

Neo-adjuvant treatment

Treatment given before the main treatment.

Oral cavity

The mouth. This includes the front two-thirds of the tongue, the upper and lower gums, the lining of the inside of the cheeks and lips, the bottom of the mouth under the tongue, the bony top of the mouth (hard palate) and the small area behind the wisdom teeth.

Oropharynx

The middle part of the pharynx.

Paan

Also known as pan or pahn. See Areca nut.

Palate

The roof of the mouth. The bony portion at the front of the mouth is known as the hard palate and the fleshy portion at the back is known as the soft palate.

Palliative care

Active, holistic care of patients with advanced, progressive illness which may no longer be curable. The aim is to achieve the best quality of life for patients and their families. Many aspects of palliative care are also applicable in earlier stages of the cancer journey in association with other treatments.

Partial laryngeal excision

An operation where only part of the larynx is removed. See Laryngectomy.

Pharynx (pharyngeal)

The passage which starts behind the nose and goes down the neck to the larynx and oesophagus. Commonly known as the throat. The top section of the pharynx is known as the nasopharynx, the middle section as the oropharynx and the lower section as the hypopharynx.

Positron emission tomography (PET)

An imaging method which reveals the level of metabolic activity of different tissues.

Prosthodontist

A specialist in replacing missing teeth. A prosthodontist is required for the specifically difficult cases of full dentures and complex rehabilitation of even partial replacements.

Protocol

A policy or strategy which defines appropriate action.

Psychosocial

Concerned with psychological influence on social behaviour.

Radical treatment

Treatment given with curative, rather than palliative intent.

Radioiodine

A radioactive substance which is concentrated in thyroid tissue, and may be used for the treatment of thyroid cancer as a form of internal radiotherapy.

Radioiodine ablation

Treatment with radioiodine to destroy any thyroid tissue remaining after surgery.

Radiologist

A doctor who specialises in imaging.

Radiotherapy

The use of radiation, usually X-rays or gamma rays, to kill cancer cells.

Recurrence

The return of cancer.

Resection

The surgical removal of all or part of an organ.

Salivary glands

Glands situated near to and opening into the mouth which produce saliva to aid the initial process of digestion.

Sinuses

Small hollow spaces in the skull around the nose. The sinuses are lined with cells that make mucus which keeps the nose from drying out. They are also spaces through which the voice can echo to make sounds when a person talks or sings.

Stridor

A harsh vibrating sound heard during breathing caused by obstruction of the air passage.

Thyroid cancer

There are four main types of cancer of the thyroid. Papillary cancer is the most common and develops in cells that produce thyroid hormones containing iodine; it most commonly affects women of child-bearing age and tends to grow slowly. Follicular cancer also develops in cells that produce iodine containing hormones, but is much less common and tends to occur in older people. Medullary cancer is rare and develops in cells that produce the hormone calcitonin; it is known to run in families. The rarest thyroid cancer is anaplastic cancer which tends to affect older people and can be confused with thyroid lymphoma; it grows rapidly and can be difficult to treat.

Thyroidectomy

Surgical removal of the thyroid gland. A partial thyroidectomy is where only part of the thyroid is removed.

Trachea

The windpipe.

Upper aerodigestive tract

The mouth, lip and tongue (oral cavity) and the upper part of the throat (larynx and pharynx).

Xerostomia: Deficiency of saliva – dry mouth

8.4 Haematopoietic stem cell transplantation and acute leukaemia services

Allograft

The transplantation of cells, tissues, or organs, sourced from a genetically non-identical member of the same species as the recipient.

Allogeneic transplant

An alternative term for allograft where a patient receives bone marrow or peripheral blood stem cells from another person.

Acute myeloid leukaemia (AML)

This is a type of cancer in which the bone marrow makes abnormal myeloblasts (a type of white blood cell), red blood cells or platelets.

Acute lymphocytic leukaemia (ALL)

Also known as acute lymphoblastic leukaemia. This is a type of cancer in which the bone marrow makes too many lymphocytes (a type of white blood cell).

Autograft

The transplantation of organs, tissues or even proteins from one part of the body to another in the same individual.

Autologous transplant

An alternative term to autograft where the patient has their own bone marrow or stem cells collected before treatment.

BSBMT

British Society of Blood and Marrow Transplantation. An organisation for those with a professional interest in stem cell transplantation, in clinical collaboration and the development of clinical trials in this field.

Haematopoietic stem cell transplantation (HSCT)

The transplantation of blood stem cells derived from the bone marrow or blood.

Joint Accreditation Committee of ISCT & EBMT (JACIE)

A non-profit body established in 1998 for the purposes of assessment and accreditation in the field of bone marrow transplantation.

Leukaemia

A cancer of the white blood cells. Acute leukaemia means the condition progresses rapidly and aggressively and requires immediate treatment.

Neutropenia/neutropenic

In patients with acute leukaemia, this is when the white blood cell levels (white cell count) become very low after treatment. White blood cells fight infection. When the level of white blood cells is very low, patients are at high risk of infection.

8.5 Oesophago-gastric cancer

Adenocarcinoma

This is a cancer that has started in the gland cells which make mucus in the lining of the oesophagus.

Brachytherapy

A type of internal radiotherapy, which involves putting a solid radioactive material close to, or inside, the tumour.

Clinical Nurse Specialists

Nurses with specialist interest and extensive training in a sub-specialty, in this case cancer of the stomach and gullet.

Chemotherapy

The medical treatment that uses chemical substances to treat disease.

Curative

This refers to treatments or therapies provided to a patient with the intent to remove symptoms caused by a specific disease or medical condition.

Dieticians

Experts in diet and nutrition, who are able to address the specific issues for patients with cancer of the gullet and stomach.

Gastric

Pertaining to the stomach

Oesophago or Oesophageal

Pertaining to the gullet

Oesophago-gastric junction

The transition point from the gullet to the stomach.

Oncology

The branch of medicine that deals with cancer.

Physiotherapists

Therapy specialists who address specific physical dysfunctions or injuries.

Palliative

This refers to treatments or therapies that focuses on relieving and preventing the symptoms caused by a specific disease or medical condition. The focus is on quality of life from individual patient's perspective.

Pathology

The medical specialty concerned with the study of the nature and causes of diseases.

Multidisciplinary team

A group of doctors, nurses and others with expertise in a specific cancer, who together, discuss and manage an individual patient's care at diagnosis and other times.

Radiologists

Doctors who use a wide variety of medical imaging techniques in order to diagnose and treat disease.

Radiology

The medical specialty that uses a wide variety of imaging techniques to visualise organs and structures within the human body for the purpose of both diagnosis and treatment of diseases.

Radiotherapy

The treatment of disease by exposure to a radioactive substance.

9 Appendices

Appendix 1: The Model of Care for Cancer Services – Addendum to the Clinical Paper

The model of care for cancer services

Addendum to the clinical paper

January 2012

Contents

1. Introduction	99
2. Networks.....	100
3. Patient experience.....	101
4. Cancer co-dependencies :	105
4.1. Executive summary	105
4.2. Defining co-dependencies.....	106
5. Early diagnosis.....	112
5.1. Specialist cancer diagnostic teams.....	113
5.2. Public health and primary care workstream.....	114
6. Common cancers and general care.....	117
6.1. Breast cancer surgery.....	117
6.2. Colorectal cancer surgery.....	118
6.3. Radiotherapy workstream	119
7. Rarer cancers and specialist care.....	120
7.1. Head and neck cancers.....	121
7.2. Brain and CNS cancers.....	122

1. Introduction

The cancer model of care⁷⁰ was published in August 2010. It was the product of nearly 12 months work from over 45 of London's cancer clinicians. Following its publication it was the subject of a comprehensive three-month engagement period with GPs, local authorities and patient groups. The feedback received was supportive and the model of care was agreed by London's NHS. The proposals are now being taken forward.

The model of care is over a year and a half old. While its recommendations still stand, this addendum has been created to address a number of factors that have emerged since its publication.

1. New evidence

Information has since come to light that would have featured heavily in both the case for change⁷¹ and model of care had it been available at the time of their creation. As an example, the results of the 2010 national cancer patient experience survey showed significantly poorer reported experience in London compared to elsewhere in the country.

2. Progress made

A number of workstreams were created as part of the model of care implementation programme. Some remain ongoing but work on public health and primary care, best practice, and radiotherapy commissioning has concluded. These workstreams created clear plans to deliver many of the ambitions and recommendations of the model of care.

3. Clarification sought

In their submissions and service plans the integrated cancer systems have sought clarification on certain recommendations in the model of care.

4. Update required

There is a need to update the economic analysis that supported the case for change and model of care. In addition, 2012/13 will see bundled tariffs for four best practice pathways operating in shadow form. The financial impact of this needs to be modelled.

This addendum to the model of care addresses all of these factors. **In doing so it does not change any of the recommendations of the agreed model of care; it supplements and clarifies them.** As such, the original model of care document should not be read without reference to this addendum.

⁷⁰ Commissioning Support for London, *A Model of Care for Cancer Services: Clinical Paper*, August 2010, <http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-model-of-care.pdf>

⁷¹ Commissioning Support for London, *Cancer Services: Case For Change*, March 2010, <http://www.londonhp.nhs.uk/wp-content/uploads/2011/03/Cancer-case-for-change.pdf>

2. Networks

Model of care	Chapter	5
	Pages	12-24

The model of care acknowledges the contribution of London's cancer networks but outlines the need to redefine the way in which they work. It makes a number of key recommendations:

From the model of care, pages 23-24

- London should shift to a model of clear commissioning arrangements and provider networks.
- The role of the existing network management teams should be redefined as cancer commissioning networks and focus on supporting the commissioning of high quality services.
- There should initially be five cancer commissioning networks embedded within commissioning arrangements.
- The configuration of provider networks should be determined as the recommendations of the model of care are implemented, particularly those regarding the further consolidation of specialist surgical services.
- A pan-London board should oversee performance across the whole city.

The model of care makes it clear that cancer commissioners in London should commission provider networks. During the process of engagement at the beginning of the implementation programme this concept was sometimes confused and interpreted to mean the existing cancer networks. These are very different things. To avoid confusion and emphasise this difference the term provider network was replaced by *integrated cancer systems*.

An integrated cancer system specification⁷² was developed that set out the minimum expectations of how these systems will work. Two groups of cancer care providers submitted collaborative proposals to meet this specification. Following an assurance process they were both authorised to continue to develop as integrated cancer systems to be commissioned to provide cancer care from April 2012. London's two integrated cancer systems are:

- London Cancer, covering north east and north central London
- London Cancer Alliance, covering south east, south west and north west London.

⁷² London Health Programmes and NHS London, *Integrated cancer systems in London: Final integrated cancer system specification*, May 2011, <http://www.londonhp.nhs.uk/publications/cancer/implementation/>

3. Patient experience

Model of care	Chapter	6
	Pages	25-28

The desire to improve both patient outcomes and experience was at the heart of the recommendations in the model of care. It also contained a number of recommendations informed specifically by the discussion of the patient panel at the time, such as the need for cancer nurse specialists or keyworkers for all patients and the need to consider support in the community where shorter hospital stays are recommended. As well as this the model of care included a discrete section on the key issues that affected patient experience, as identified by the patient panel.

The model of care was published before the results of the 2010 national cancer patient experience survey⁷³ were known. These results show significantly poorer reported experience in London compared to elsewhere in the country.

From the 2010 national cancer patient experience survey report, page 114

Analysis of the survey results by strategic health authority indicates that there are some significant differences between regions, with 10 questions on which there are statistically significant differences. On 9 of these 10 questions, London is the worst performing region.

- Patients being told they could bring a family member or friend with them when first told they had cancer
- Easy to contact the clinical nurse specialist
- When had important questions to ask a ward nurse, received answers they could understand all/most of the time
- Confidence and trust in all ward nurses treating them
- Post discharge given enough help from health and social services
- Given enough emotional support by staff when treated in outpatients or as a day case patient
- Waiting time within 30 minutes at last outpatient appointment
- GPs, nurses at the practice definitely did everything needed to support patient whilst they were having treatment
- GPs, hospital doctors, hospital nurses, specialist nurses, community nurses worked well together to give best possible care

These findings replicate to some degree the findings of the previous cancer surveys in 2000 and 2004, and those of the national patient surveys. Two themes emerge: London fares worst on questions related to the general organisation of NHS services, especially those connecting primary care and hospital care; and on certain

⁷³ Department of Health, National Cancer Patient Experience Survey Programme: 2010 National Survey Report, December 2010

aspects of information. An area of particular concern is the significantly worse position in London in respect of patients' ease of contacting the clinical nurse specialist.

These results clearly underline the case for changing cancer services in London, giving further evidence that patients in London experience fragmented care. In addition the results emphasise some of the key issues raised by the original patient panel, such as the variable access to clinical nurse specialists and the need for support following discharge from hospital.

The patient panel that worked on the model of care concluded its work upon publication. Following the agreement of the model of care a new panel was formed to work on the implementation programme. The implementation patient panel were acutely aware of the results of the national survey in London. The members of the implementation have looked at the key issues identified by the earlier model of care patient panel and revised them to outline 21 key issues or recommendations (below). It is the responsibility of integrated cancer systems and commissioners alike to ensure that these issues and recommendations are addressed in the development of cancer services in the capital.

Whole pathway approach

1. Survivorship should be considered as an issue from point of diagnosis.
2. Patients should have access to a cancer nurse specialist or a designated keyworker throughout their cancer journey, including in their local hospital. CNS vacancies should be filled and their absences covered.
3. Patients should have a joined up pathway of care throughout their treatment including input from rehabilitation, the primary care team and social services when appropriate. This input should be available at any point along the whole pathway.
4. Holistic assessments should be carried out at appropriate stages along the pathway. Special considerations are also needed to address the care of those with co-morbidities, such as long term conditions or mental illness.
5. Patients and GPs should be provided with discharge information and follow-up advice in accessible language.
6. Palliative care should be a collaboration between patients, carers and health professionals.
7. Fertility guidelines and policies should be in place for patients of all appropriate ages.

Information and communication

8. Public awareness of cancer related symptoms and problems associated with delays in early diagnosis should be raised. Social marketing should analyse the

best methods for engaging patients early in the diagnostic pathway or in screening programmes to improve outcomes.

9. The breaking of bad news should be done sensitively by a senior clinician who has been trained in advanced communication. This should be conducted in an appropriate environment with a CNS and relative or friend present.
10. Patients should be informed of all appropriate treatment options and locations at all stages of their cancer journey to ensure shared informed decision-making.
11. Patients should have clear high quality outcome information to inform these choices. The information provided should always be at a level and in a format appropriate to the patient's and carer's understanding.
12. Clinical staff must ensure that patients, and the family members and carers the patient wishes to be involved, really do understand the condition, the potential benefits and risks of proposed diagnostic procedures and treatments, and any future lifestyle requirements and limitations.
13. Carers (professional, relatives and friends) should be acknowledged as partners in care and be appropriately communicated with and supported with information and professional help as needed.
14. With the increasing focus on day surgery and early discharge, it is particularly important to engage the whole primary care team and social care services in a proactive and seamless manner.
15. Patient reported outcome measures (PROMs) and patient experience measures should be designed in partnership with patients and carers and included in annual quality accounts.
16. Patients should be included in all correspondence between secondary care health professionals and their GP about their treatment.
17. Patients and carers should be provided with information on support groups, benefits entitlement, and psychosocial support as soon as appropriate.
18. Commissioners and providers should maintain or improve upon the current levels of public and patient involvement through the transition to integrated cancer systems and into the future.

Transport

19. Patients acknowledge the need to travel further for best specialist care, but expect transfer back to local providers or the community as soon as is practicable for ongoing or follow-up care.
20. All proposals regarding the location of services and investment in equipment must include considerations of patient transport.
21. As certain treatments make patients unwell and/or immunologically compromised, ways of alleviating problems encountered due to public transport

must be considered as good clinical practice. The patient panel has recommended that a taxi voucher scheme be given high consideration.

4. Cancer co-dependencies

4.1. Executive summary

The framework looks at specialist cancer surgery and bone marrow transplant only. For every specialist cancer procedure, collocation of the surgical and general medical team is assumed. The framework also sets out additional support services for each specialist cancer procedure. The following co-dependencies are highlighted:

Optimal service collocation:

- All specialist cancer services have a dependency (purple relationship) with the general service for that tumour type (for example, specialist lung cancer surgery has a dependency with thoracic surgery).
- Liver cancer surgery with pancreatic surgery.
- Pancreatic cancer surgery with liver surgery.
- Specialist gynaecological cancer surgery with bladder and prostate surgery.
- Soft tissue sarcoma (for retroperitoneal sarcoma surgery only) with: oesophago-gastric surgery, bladder and prostate and renal surgery (specialist urology).

Desirable service collocation:

- Specialist colorectal cancer surgery with: bladder and prostate surgery and liver surgery
- Specialist bladder and prostate cancer surgery with: colorectal surgery and renal surgery
- Oesophago-gastric cancer surgery with: lung surgery, colorectal surgery, UAT surgery, and pancreatic surgery
- Specialist testicular cancer surgery with: bladder and prostate surgery
- Specialist testicular cancer surgery with: lung surgery
- Specialist renal cancer surgery with: lung surgery, colorectal surgery, bladder and prostate surgery
- Specialist UAT cancer surgery with: oesophago-gastric surgery, thyroid surgery, and brain and CNS surgery
- Specialist thyroid cancer surgery with: UAT surgery
- Brain and CNS cancer surgery with: UAT surgery
- Specialist gynaecological cancer surgery with: colorectal surgery and oesophago-gastric surgery (noting that collocation with upper-GI surgery is where the dependency lies).

- Pancreatic cancer surgery with: colorectal surgery and oesophago-gastric surgery
- Bone sarcoma with: UAT surgery
- Soft tissue sarcoma with: UAT surgery, and gynaecological surgery

The key themes regarding the levels of dependency between cancer specialist services and support services are:

- All specialist services have a dependent relationship with cancer nurse specialists.
- Most specialist services have a dependent relationship with high dependency units and specialist imaging.
- All specialist services have a moderately dependent relationship with: pre-operative assessment; enhanced recovery; clinical psychology (with the exception of brain and CNS cancer surgery which has a dependent relationship); basic biomedical research and clinical research.
- All specialist services have either a dependent or moderately dependent relationship with specialist pathology services.
- Most specialist services have either a dependent or moderately dependent relationship with rehabilitation services.

4.2. Defining co-dependencies

The framework sets out the dependencies for specialist cancer services using the following definitions:

Coding	Definition
PURPLE	Optimal service collocation (dependent relationship) Location: Collocation on the same hospital site
LILAC	Desirable service collocation (moderately dependent relationship) Location: If possible, collocated within the same hospital site, otherwise in the same trust

When determining the levels of dependency within the framework, the following has been considered:

- Clinical dependency – Is the collocation of the service required to deliver a safe service?
- Patient experience – will the collocation of the service result in fewer transfers, reduced lengths of stay and improved patient experience?

- Effective use of resource and financial efficiency – will collocation use available resource more effectively, optimise scale economies and resource capability, and reduce duplication?
- Optimal level of service - will service collocation improve service delivery?

The completed framework

The framework section that sets out levels of co-dependency between specialist cancer services and the corresponding wider surgical service is set out below. For example, the framework shows a moderately dependent relationship between oesophago-gastric cancer surgery and lung surgery.

Taking a service from the left hand column and reading across will show the level of dependency on other services. The framework is only intended to be read in this way, and not vertically.

This framework represents the preferred model for collocating cancer services. However, it is accepted that it may not be possible to meet these co-dependency requirements. If such an instance arises it will be the responsibility of the ICS concerned to explain the issues involved and provide assurance, through risk assessment, that alternative proposals are safe and will deliver the required quality.

Figure 1: Codependency framework for specialist cancer services with wider surgical service

		GENERAL SERVICE														
		Breast general surgery	Lung surgery (thoracic surgery)	Colorectal general surgery	Bladder and Prostate general surgery	Oesophago-gastric surgery	Testicular surgery	Penile surgery	Renal general surgery	UAT general surgery	Thyroid general surgery	Brain and CNS general surgery	Gynaecological surgery	Pancreatic surgery	Liver service	
CR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
SPECIALIST SURGERY / SPECIALIST PROCEDURE	Breast cancer surgery	a														
	Lung cancer surgery	b														
	Colorectal cancer surgery	c														
	Bladder and Prostate cancer surgery	d														
	Oesophago-gastric cancer surgery	e														
	Testicular cancer surgery	f														
	Penile cancer surgery	g														
	Renal cancer surgery	h														
	UAT cancer surgery	i														
	Thyroid cancer surgery	j														
	Brain and CNS cancer surgery (NOTE 3)	k														
	Gynaecological cancer surgery	l														
	Pancreatic cancer surgery	m														
	Liver cancer surgery	n														
	Haematopoietic progenitor cell transplantation (HPCT) (NOTE 4)	o														
	Skin cancer surgery	p														
	Sarcoma: bone	q														
	Sarcoma: soft tissue	r														

Cell Reference	Explanatory Notes
F4	The dependency between specialist testicular cancer surgery and bladder and prostate surgery is specifically for residual disease managed surgically undertaken by specialist retroperitoneal surgeons or urologists. Most often undertaken laproscopically or robotically assisted.
I2 / J2	UAT cancer surgery may require cardiothoracic surgeons to access the upper part of the chest, usually the superior mediastinum to resect UAT or thyroid tumours that reach into the thorax.
L4	The dependency between gynaecological cancer surgery and urology is for both specialist uro-oncology as well as general urology (endoscopic and reconstructive urology).

L5	The dependency between gynaecological cancer surgery and Oesophago-gastric surgery is more specifically a requirement to have upper gastro-intestinal surgery onsite as radical ovarian cancer de-bulking involves access to the upper abdomen and may include a diaphragmatic strip, resection of surface liver deposits and a splenectomy
R4 / R5 / R8	There is an optimal (purple) dependency only for retroperitoneal soft-tissue sarcoma, between retroperitoneal soft-tissue sarcoma and specialist urological surgery and upper GI, including oesophago-gastric, for surgery when the sarcoma involves important proximal organs such as ureters, bladder, or duodenum.

Figure 2: Co-dependencies framework for specialist cancer services with support services

		SUPPORT SERVICE																													
		CR	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
		HPCT	Skin service	Sarcoma service	Paediatrics and young people service	Thoracic medicine	Hepatology	Neurology	Specialist gastroenterological	Endocrinology	Renal service	Maxillofacial including dentistry	ENT	Plastic surgery (Onco-plastic)	Dermatology	Pathology (histo, cyto, molecular, chemical)	pre-operative assessment (cardiology, respiratory medicine, anaesthetics) (NOTE 1)	Interventional radiology	Specialist imaging	Specialist radiotherapy	ICU (NOTE 1)	HDU	Enhanced recovery	Cancer nurse specialist	Clinical psychology	Lymphoedema (NOTE 5)	Multidisciplinary rehabilitation (NOTE 1) (NOTE 2)	Dietetics	Basic biomedical research	Clinical research	
Breast cancer surgery	a																														
Lung cancer surgery	b																														
Colorectal cancer surgery	c																														
Bladder and Prostate cancer surgery	d																														
Oesophago-gastric cancer surgery	e																														
Testicular cancer surgery	f																														
Penile cancer surgery	g																														
Renal cancer surgery	h																														
UAT cancer surgery	i																														
Thyroid cancer surgery	j																														
Brain and CNS cancer surgery (NOTE 3)	k																														
Gynaecological cancer surgery	l																														
Pancreatic cancer surgery	m																														
Liver cancer surgery	n																														
Haematopoietic progenitor cell transplantation (HPCT) (NOTE 4)	o																														
Skin cancer surgery	p																														
Sarcoma: bone	q																														
Sarcoma: soft tissue	r																														

SPECIALIST SURGERY / SPECIALIST PROCEDURE

Cell Reference	Explanatory Note
NOTE 1	In those cases where patients have co-morbidities, for all listed procedures, there is an absolute dependency with the listed service (ICU, pre-operative assessment, multi-disciplinary rehabilitation)
NOTE 2	Multi-disciplinary rehabilitation encompasses the rehabilitation therapies (physiotherapy, occupational therapy, speech and language therapy) with dietetics and lymphoedema listed separately. Some tumour types need additional staff, eg stoma care for colorectal, sexual dysfunction management for gynae, dental care for UAT. Detailed configuration should be checked against NICE guidance
NOTE 3	Brain and CNS surgery has an absolute dependency with ophthalmology
NOTE 4	HPCT has an absolute dependency with specialist haematology services and there are benefits in collocating with paediatric HPCT given that this procedure spans the whole age range
NOTE 5	The dependency between any surgery and lymphoedema care is specifically for procedures involving lymph node dissection
A25	Breast cancer surgery has a requirement for prosthetic support. This is usually provided by maxillofacial laboratories sites in maxillofacial departments.
A32	The dependency between breast cancer surgery and specialist imaging is specifically for IMRT and EMRT
C32	The dependency between colorectal cancer surgery and specialist imaging is specifically for CT scanning only
L22	The dependency between gynaecological cancer surgery and specialist gastro-enterology is specifically for services such as stenting for recurrent cancer and support of GI treatment related morbidity
L33	The dependency between gynaecological cancer surgery and specialist radiotherapy is specifically for brachytherapy
P33	The dependency between skin specialist cancer surgery and specialist radiotherapy is specifically for rarer skin cutaneous lymphoma for Total Body Skin Electron Therapy

5. Early diagnosis

Model of care	Chapter	7
	Pages	29-50

The model of care notes that the earlier a cancer is diagnosed and treated, the greater the prospect of survival and improved quality of life. Achieving earlier diagnosis has the greatest potential for improving outcomes and survival for cancer patients in London. The *case for change* notes that raising survival rates in England to match the best in Europe could save approximately 1,000 lives per year in London. This area requires urgent attention and further action is needed to achieve earlier diagnoses of cancer.⁷⁴

The *case for change* for London's cancer services goes on to state that early diagnosis could be improved by:

- Increasing early recognition of signs and symptoms among both the public and in primary care and ensuring that advice is sought at the earliest opportunity
- Ensuring prompt referral and access to diagnostics in both primary and secondary care
- Increasing understanding of the potential benefits of screening to increase uptake rates
- Designing, agreeing and implementing locally agreed, clinically effective pathways for early diagnosis
- Understanding the differences in population groups in both the awareness of cancer signs and symptoms and in their perceived barriers to care.

The public health and primary care working group has been established to take this work forward and more recently, cancer prevention and early diagnosis has been adopted by the London Health Improvement Board as one of its three priority areas. The London Health Improvement Board is a new partnership between the Mayor of London, London Councils and the NHS, to improve the health of all Londoners. It aims to tackle the biggest health problems in the capital - including cancer, childhood obesity and alcohol abuse – by taking a pan-London, strategic view.

Improvement will be achieved in cancer by reducing the number of smokers in the capital by 20 per cent in the next six years; increasing the number of Londoners taking up the offer of bowel cancer screening by 33 per cent over the next three years; and increasing the number of patients seeking an earlier diagnosis for cancer by 10 per cent over the next three years.

⁷⁴ Department of Health, *Cancer Reform Strategy: achieving local implementation – second annual report*, 2009

5.1. Specialist cancer diagnostic teams

Model of care	Section	7.3.4
	Pages	37-38

From the model of care, pages 23-24

- Specialist cancer diagnostic teams should be strengthened to expedite an accurate diagnosis.

In its service plan submitted in October 2011 the London Cancer Alliance sought clarification of this recommendation. The section from the model of care that deals with specialist diagnostic teams is repeated in full below.

From the model of care, pages 37-38

A central theme of the *Cancer Reform Strategy* is that care should be provided as close to home as possible. However, most cancer patients recognise that they may have to travel to see a specialist team to receive the highest possible quality of care, especially for complex investigations or treatments. For example, in some instances GPs may strongly suspect cancer and therefore it is important that patients have rapid access (two-week referral) to specialist diagnostic services and teams.

Whilst specialist cancer diagnostic teams are an integral part of a multidisciplinary therapeutic team, they are more than the routine team in place for seeing a standard new patient referral. Organised by tumour type, they have the expertise to diagnose cancer accurately and rapidly. Specialist cancer diagnostic teams should operate to the same standards across London provider networks. Where possible, and where necessary, these teams should integrate seamlessly with general diagnostic activity, providing all the necessary investigations in one visit and results on the same day.

There is a need for specialist diagnostic teams to be established across London to expedite an accurate diagnosis and any subsequent referral to the most appropriate team. The specialist cancer diagnostic team must appreciate all of the different imaging technologies to accurately interpret findings and recommend the optimal immediate diagnostic and staging pathway. Specialist cancer diagnostic teams should be able to engage other imaging modalities without patients having to return to a GP for these investigations to be ordered. These teams can seamlessly place patients onto a fast-track pathway which has the potential of reducing the time to treatment.

The integrated system stated that it interprets the recommendation as the need for multidisciplinary teams to be compliant with national standards, including the presence of pathologists and radiologists where appropriate.

5.2. Public health and primary care workstream

Early diagnosis is essential to improving outcomes for cancer patients. The *case for change* for London's cancer services notes that early diagnosis could be improved by:

- Increasing early recognition of signs and symptoms among both the public and in primary care and ensuring that advice is sought at the earliest opportunity
- Ensuring prompt referral and access to diagnostics in both primary and secondary care
- Increasing understanding of the potential benefits of screening to increase uptake rates
- Designing, agreeing and implementing locally agreed, clinically effective pathways for early diagnosis
- Understanding the differences in population groups in both the awareness of cancer signs and symptoms and in their perceived barriers to care.

The model of care gives recommendations for implementation that would most certainly contribute to improving survival rates to meet the best in Europe and could translate into saving 1,000 Londoners' lives annually. This is reflected in *Improving Outcomes: A Strategy for Cancer* which commits to the challenge of improving outcomes to the best in Europe by 2014/15.

The model of care summarises the actions that are needed in four categories: those that reduce the incidence of preventable cancer through lifestyle changes, those that improve access to screening services where there is evidence that this will save lives, those that will achieve earlier diagnosis and those that will ensure that all patients have access to the best possible treatment. Within this framework, it states that 'diagnosis of cancer at a later stage is generally agreed to be the single most important reason for the lower survival rates in England'.

Both the model of care and the *Improving Outcomes: A Strategy for Cancer* set out the key elements of the early detection pathway that are integral to the National Awareness and Early Detection Initiative (NAEDI). To improve earlier detection and diagnosis in London we need to:

- Increase public awareness of cancer signs and symptoms
- Overcome barriers to presentation to primary care
- Overcome clinical and system barriers to prompt onward referral within and between primary and secondary care
- Improve GP access to diagnostic tests to help confirm or exclude a diagnosis of cancer
- Ensure that, once cancer is suspected, there is improved access to specialist pathways in secondary care and that the same guidelines are applied to patients who present to hospitals through non-urgent or emergency care pathways.

The output of this working group, *A Strategy for Earlier Diagnosis of Cancer in London*⁷⁵, recommends priority actions for a systematic spread of the most effective interventions for earlier detection across all of London.

From A Strategy for Earlier Diagnosis of Cancer in London, page 5

It is recommended that:

- A pan-London high quality cancer intelligence service should be configured, through the coordination and focussing of existing resources and expertise, to ensure that implementation is based on assessment of needs and effectiveness, and that the impact of actions are monitored and evaluated. This will integrate with, be part of and not separate from, overall intelligence functions as they emerge from the transition to the new NHS commissioning system and including Public Health England.
- Beginning with the national bowel cancer symptoms awareness campaign, measures that improve both the public awareness of symptoms of cancer and encourage early presentation to primary care and, where appropriate, improve uptake of screening services must be commissioned and implemented. This will best be achieved by the configuration of a small specialist team at a London level in coordination with action and 'advocacy' at a local level.
- Primary care leadership is essential to the whole of the early detection pathway. It is recommended that each clinical commissioning group (CCG) should identify a primary care cancer lead resourced with up to two sessions per week who should be supported by robust cancer network leadership, sustainably resourced in line with national guidance. Primary care leadership will have an important role in ensuring that GPs have up-to-date knowledge of cancer guidelines for referral and diagnosis.
- Commissioners should ensure that all GPs in London have direct access to the four diagnostic tests identified by *Improving Outcomes: A Strategy for Cancer* and should request tests in line with the guidance and pathways to be issued by the Department of Health. Primary care should ensure that access to these tests following patient presentation is rapid. In addition, providers should ensure that results and reports are available within two weeks and that abnormal findings result in the direct referral into specialist pathways.
- In alignment with NICE guidance, there needs to be information and support available for those with raised familial risks of cancer so that they access primary care and, where appropriate, screening services, as early as possible.
- The output specifications of the commissioned pathways of integrated cancer systems should include measures for improved one year survival, as a proxy for longer term survival, and stage at presentation and emergency presentation proxies for one year survival. Systems should work closely with primary care, CCGs and networks across the whole of the early detection pathway but with a particular emphasis on optimising referral from primary care. They must ensure ongoing prompt access to specialist enhanced pathways once cancer is suspected and the acute oncology services should provide an enhanced

⁷⁵ Unpublished

pathway for those who continue to present as emergencies.

The public health and primary care sub group have been working on an action plan to take this work forward.

6. Common cancers and general care

6.1. Breast cancer surgery

Model of care	Section	8.2.1
	Pages	52-55

From the model of care, page 53

- The IOG [NICE improving outcomes guidance] recommends a minimum catchment population of 200,000. The demography and geography of the capital mean that London providers should serve populations of more than 300,000.

Clarification on this recommendation has been sought by the London Cancer Alliance in its service plan. The system notes that this population coverage is not a requirement of the breast IOG⁷⁶ and suggests a contradiction with the model of care ambition for common cancer service to be provided closer to patients' homes.

The introduction to the common cancer surgery section of the model of care outlines the rationale underpinning all of its recommendations.

From the model of care, pages 51-52

The *case for change* highlights a significant number of low volume providers of common cancer surgical services. For tumour types where there are low volume providers, commissioners should consolidate surgical services. This is based not merely on the relationship between volumes and outcomes, but on the wider ambition to provide, and continuously improve, high quality services to all Londoners. In developing the proposed model of care for common cancer surgery, the following principles have therefore been taken into account:

1. It is the ambition of London's NHS to provide consistent world-class services.
2. The integration of research with clinical care is essential for the continuous improvement in the provision of high quality services. Consolidation of services would improve the research environment.
3. Consolidating services reduces duplication of effort and equipment and dilution of expertise.
4. NICE Improving Outcomes Guidance (IOGs) recommends minimum volumes for a variety of services. Where services have been rationalised, London should aim to go beyond the minimum volumes laid out in NICE IOGs.

⁷⁶ NICE, *Improving outcomes in breast cancer: manual update*, 2002

5. London has a younger population than the national average and should therefore aspire to exceed recommended national minimum volumes.
6. The population served by London's NHS is swelled beyond the eight million people resident within the metropolitan area by inflows of patients from outside the capital.

Where recommended surgical volumes are found in the following sections they are based on expert clinical advice, which has taken into consideration all of these factors.

The recommendation that London's breast cancer surgery services should cover a population of 300,000 therefore aims to address the issue of low volume providers. It intentionally exceeds the ambition of national guidance.

Integrated cancer systems must address the issue of low volume surgery providers. To require this does not contradict the equally important recommendation that common cancer services should be localised. Integrated cancer systems should outline plans to meet the ambition of the model of care. They should aspire to a configuration of sufficiently sized units that best serves their populations.

If an integrated cancer system does not wish to use population size as the organising principle then it should propose an alternative vision for how it will address the issue of low volume providers. Proposals will be considered if they exceed the minimum activity threshold. This alternative vision should include the assessment of any risks that the proposed approach poses and how these will be mitigated.

6.2. Colorectal cancer surgery

Model of care	Section	8.2.2
	Pages	56-58

From the model of care, page 57

- Flexible sigmoidoscopy should be substituted for total colonoscopy as appropriate.

London Cancer has sought clarification on this recommendation; its full context from the model of care is given below.

From the model of care, pages 56-57

Recent evidence strongly supports flexible sigmoidoscopy as the investigation of choice in patients with colorectal symptoms of a change in bowel habit and/or rectal

bleeding and no other symptoms, risk factors or anaemia. Flexible sigmoidoscopy should be substituted for total colonoscopy as appropriate. This would allow more procedures to be carried out at a lesser cost, with subsequent financial savings.⁷⁷

6.3. Radiotherapy workstream

Model of care	Section	8.5
	Pages	65-67

From the model of care, page 67

- Agreement should be reached across London on referrals for radiotherapy treatments, fractionation regimens and maximum waiting times.
- Centralised commissioning of radiotherapy should be considered to ensure that patient flows are managed more efficiently across London and to maintain high safety and quality standards.

A radiotherapy commissioning workstream was set up as part of the model of care implementation programme. The working group reported in July 2011 and its final report⁷⁸ makes the following recommendations:

From the London Review of Radiotherapy Commissioning: Final Report, pages 5-6

- A London radiotherapy technology advisory group (RTAG) should be established to advise commissioners on emerging technology and new treatments. The RTAG would produce clear, evidence based guidance to advise commissioners on what should and should not be commissioned. Commissioners should contract in line with RTAG guidance.
- Intensity modulated radiotherapy (IMRT) is a technique that can deliver improved dose distributions compared to conventional techniques and it should be available to all clinical oncologists when deciding the optimum treatment for their patients.
- IMRT should be considered as the standard of care in defined clinical situations and offered as a treatment choice to all appropriate patients.
- An international randomised clinical trial for the effectiveness of intraoperative radiotherapy for breast conserving therapy is being lead by the Royal Free Hampstead NHS Trust. Commissioners should use the results of this study to inform future commissioning of intraoperative radiotherapy.

⁷⁷ Kent, A.J. et al., 'The use of symptoms to predict colorectal cancer site. Can we reduce the pressure on our endoscopy services?' *Colorectal Disease*, 2010: 12(2)

⁷⁸ Unpublished

- Dose fractionation should be reviewed utilising the MALTHUS modelling tool once it is released.
- London commissioners should consider whether they would wish a pan London approach to be taken for those radiological treatments and interventions which either require service planning for populations of over one and half million and up to seven million.
- To deliver a comprehensive network of radiotherapy facilities, with consistency of process and outcome, the commissioning of radiotherapy on a London level should be explored with CCGs. CCGs should determine whether this would involve only providing planning and strategy expertise or also providing a contracting consortium holding a centralised budget.
- The integrated cancer systems should develop robust capital replacement programmes to ensure that treatment equipment and software is replaced at appropriate intervals.
- The number of brachytherapy services should be reviewed with the aim of reducing inefficiency within the service.
- Consideration should be given to utilising spare capacity within the private sector where this can be delivered within NHS tariffs.
- Equipment manufacturers and the private sector should be encouraged to work with the NHS to evaluate new technology prior to it being considered for funding by the NHS.
- Until evidence as to the effectiveness of a new technology, funding should continue to be considered on the basis of Individual Funding Requests. Providers with cyberknife and/or gamma knife should undertake a formal evaluation of this technology.
- Radiotherapy providers in London should review their current recording systems so that they provide activity information on planning activity by tumour site as well as by treatment method by 1st October 2011 so that this can be taken forward in conjunction with the shadow running of the national tariff.
- The London cancer implementation finance group should take forward implementation of the national currency, improve consistency of recording to facilitate good benchmarking and speed the development of appropriate common tariffs for both the planning and delivery of radiotherapy.
- London commissioners should require all radiotherapy providers to produce plans to mitigate the adverse aspects of patient experience through travel and access problems.
- Integrated cancer systems should develop workforce plans to provide the number and skill mix of staff to support the implementation of new technology, such as IMRT.

The radiotherapy working group has developed an action plan to ensure these recommendations are met.

7. Rarer cancers and specialist care

7.1. Head and neck cancers

Model of care	Section	9.5
	Pages	86-87

From the model of care, page 87

- Five surgery providers should be commissioned to deal with both UAT [upper aero-digestive tract] cancers and thyroid cancers. Thyroid cancers should be managed as part of the specialist head and neck multidisciplinary team.

The London Cancer Alliance has sought clarification on both aspects of this recommendation. Regarding the proposed reduction in the number of surgical services, the context for this recommendation is given below:

From the model of care, page 86

In 2007/08 there were 26 providers of UAT surgical cancer services in London. This has since been reduced to seven providers. For malignant thyroid surgery there were 23 providers in 2007/08 which has now been consolidated into twelve. There were only 241 thyroidectomies performed in London for cancer in 2007/08. Further consolidation is recommended for UAT and thyroid cancers. Five providers should be commissioned to deal with both UAT cancers and thyroid cancers.

As with common cancers, all recommendations in the rarer cancers chapter of the model of care that advocating the further consolidation of surgical services are based on a set of clear principles:

From the model of care, pages 79-80

1. It is the ambition of London's NHS to provide consistent world-class services.
2. The integration of research with clinical care is essential for the continuous improvement in the provision of high quality services. Consolidation of services would improve the research environment. Specialist and rarer cancer services should be linked to high quality cancer research institutions that can demonstrate and improve uptake to clinical trials and promote translational research in the cancer field including, where appropriate, Academic Health Science Centres (AHSCs) and specialist cancer organisations.
3. Consolidating services reduces duplication of effort and equipment and dilution of expertise.
4. NICE Improving Outcomes Guidance (IOGs) recommends minimum volumes for a variety of services. Where services have been rationalised, London should aim

to go beyond the minimum volumes laid out in NICE IOGs.

5. London has a younger population than the national average and should therefore aspire to exceed recommended national minimum volumes.
6. The population served by London's NHS is swelled beyond the eight million people resident within the metropolitan area by inflows of patients from outside the capital.

A principal theme of the *case for change* is that the future improvement in the treatment of cancer patients would be best supported by specialist cancer services being provided by fewer teams with a higher concentration of expertise and the associated larger workloads. The additional capacity required may involve the provision of some protected surgical beds for cancer patients in order to prevent emergency work compromising the ability of the provider to deliver timely cancer care.

[...] The recommendation to further consolidate services is based on the relationship between volumes and outcomes and on the wider ambition to provide high quality services to all Londoners.

The recommendation is that thyroid cancers be managed by specialist head and neck multidisciplinary teams.

The London Cancer Alliance have queried the evidence base for this with LHP. Further analysis and review is being undertaken within the thyroid working group.

The head and neck cancers IOG allows thyroid cancers to be managed either together with the UAT cancers or in a separate multidisciplinary team.⁷⁹ However, since thyroid cancer is a relatively rare condition with an incidence rate of roughly two patients per 100,000 population per year, it is recommended that malignant thyroid tumours should be managed by specialist head and neck multidisciplinary teams. The number of thyroid cancers operated on each year is small and the majority of these cases are undertaken by ENT surgeons (rather than general surgeons or endocrine surgeons who manage benign thyroid cases). Thyroid multidisciplinary teams who manage benign thyroid cases should have strong links to the specialist head and neck multidisciplinary team.

Model of care, pages 86-87

If an ICS wished to provide a different model then this would be considered if it could be justified. For example, should an ICS wish to provide a separate thyroid MDT they should demonstrate how surgeons would achieve the minimum thresholds for operations and how surgeons would operate in a thyroid MDT.

7.2. Brain and CNS cancers

⁷⁹ NICE, *Improving Outcomes in Head and Neck Cancers – The Manual*, 2004

Model of care	Section	9.6
	Pages	87-89

The model of care makes a number of recommendations for the future delivery of services for brain and central nervous system (CNS) cancer. London's integrated cancer systems have sought clarification on the following two key recommendations for this tumour type:

Commissioners should reduce the number of brain and CNS cancer surgical service providers from seven to four, and neuro-oncology services should be located on these sites.

Rapid access diagnostic one-stop clinics with access to MRI should be established for patients with suspected brain tumours. These clinics could be run under the care of neurologists.

LCA: re reduce number and co-locate with neuro-oncology – Clarification of the definition of neuro-oncology services requested from LHP

LC: re rapid access: As brain tumours require a histological diagnosis which has to be done as a surgical procedure, it is not appropriate to have a one-stop clinic for brain cancer.

The model of care section covering these two key recommendations is shown below:

Currently there are seven providers of adult brain and CNS cancer surgical services in London. It is recommended that commissioners reduce this to four providers serving catchment populations of at least 2 million, with neuro-oncology services located on these sites and strong links with local acute hospitals for referral.

Neurologists should be more engaged with managing patients, both pre- and post-operatively. There should be rapid access diagnostic one-stop clinics with access to magnetic resonance imaging (MRI) for patients with suspected brain tumours. Such clinics could be run under the care of neurologists.

Currently, patients may have to be referred from the neurosurgery centre to an oncology centre for treatment. Collocation of neuro-oncology services at four centres would allow development of highly specialist molecular and genetic neuropathology laboratories and expertise.

Model of care, page 88

In addition the model of care makes the following recommendation in the brain and CNS cancer section (a recommendation reiterated in the head and neck cancer section of the document):

There should be two spinal cord specialist multidisciplinary teams collocated with the two centres in London for base of skull and pituitary tumours.

Re 2 spinal cord co-located with base of skull: The LCA ICS is unclear as to the evidence for this and will commission experts in the field to work with them to clarify the current international evidence and then plan an appropriate programme of care pan London.

Base of skull and pituitary tumours should be differentiated from other head and neck cancers. Two centres should be commissioned for their treatment in London, collocated in centres with specialist head and neck services and neurosurgery given the high level of overlap between them. Two of the five specialist head and neck services should be collocated with neurosurgery, which would also provide economies of scale benefits and reduce duplication. Links are required between specialist neurosurgeons and all specialist head and neck multidisciplinary teams.

Model of care, page 86

The head and neck cancers section of this model of care recommends the commissioning of two centres in London for base of skull and pituitary tumours, collocated in centres with neurosurgery and two of the five specialist head and neck services. There should also be two spinal cord specialist multidisciplinary teams collocated with these services.

Model of care, page 88

Specialist urological cancer centres

The clinical evidence

INTRODUCTION

The purpose of this paper is to summarise the clinical evidence base that supports the case for change being made for urological cancer services in north central and north east London. The case for change can be found on [London Cancer's website here](#). Whilst it is by no means an exhaustive search of the literature, it does show that there is a broad evidence base in support of the changes to services that are being proposed, that demonstrates improved outcomes related to both higher surgeon as well as higher hospital volumes. Abstracts from the journals are attached, with a summary of their key findings in the paragraphs below. These have been organised to show:

- A general volume-outcome relationship in surgery
- A volume-outcome relationship in cancer surgery
- A volume-outcome relationship in urological surgery, renal and bladder
- A volume-outcome relationship in prostate cancer surgery, both for robotic assisted radical prostatectomy and open radical prostatectomy.

For further information, please contact *London Cancer* by email at contact@londoncancer.org or by telephone on 020 3108 2334.

1. The volume-outcome relationship

Since the 1970s studies have been examining the effect that the number of procedures that surgeons carry out has on the risk of death of the patients that they operate on. One study from 1979 noted that the mortality rates associated with some surgical procedures decreased with increasing number of operations and suggested that the data supported the value of centralisation by region for certain operations¹. Since then the relationship between the number of patients operated on by a surgeon each year ('surgical volumes'), the number of patients operated on at a hospital each year ('hospital volumes'), and the outcomes of operations for the patients has been a rich vein of research.

2. The volume-outcome relationship in cancer

A study from the late 1990s supported the hypothesis that when complex cancer operations are provided by surgical teams in hospitals with speciality expertise, mortality rates are lower².

A 2000 review of the literature in this area shows that most support a positive volume outcome relationship in initial cancer treatment³. It concluded that the literature suggests that, for all forms of cancer, efforts to concentrate its care would be appropriate.

A systematic review from 2002 concluded that high hospital and surgeon volumes are associated with better outcomes across a wide range of procedures, including cancer surgery⁵.

Another review of the literature, this time in 2005, noted that high-volume providers have significantly better outcomes for complex cancer surgery⁸.

A US analysis of trends concluded that increasing hospital and surgeon volumes explain much of the decline over time in inpatient mortality for five of the six cancer operations studied⁹. This study recommended that concentrating cancer resections among high-volume providers should lead to further reduction in inpatient mortality.

A 2008 study, again from the US, revealed large disparities in perioperative mortality between lowest- and highest-volume centers¹¹. It concluded that there were a large number of potentially avoidable deaths each year, if outcomes at low-volume hospitals were improved to the level of highest volume centres. The study concluded that there were significant lessons to be learned from the way that high-volume hospitals care for patients in the perioperative period but did not advocate consolidation into high volume centres.

A recent study on the effect of volume on survival concluded that, after adjusting for differences in the case mix, cancer patients treated by low-volume surgeons in low-volume hospitals had poorer 5-year survival rates²⁹.

3. The volume-outcome relationship in urological cancer

A 2004 systematic review concluded that outcomes after radical prostatectomy and cystectomy are on average likely to be better if these procedures are performed by and at high volume providers⁶. This review found the evidence for a similar effect in radical nephrectomy unclear.

A separate review in 2004 stated that the evidence that high volume hospitals have better outcomes from various types of urological cancer surgery was increasing⁷. It concluded that the ultimate implication of these studies was that centralising health care may yield better outcomes from urological cancer operations. It noted that this would be controversial and suggested that another approach would be to determine key factors that are the drivers behind better outcomes at high-volume centres and attempt to transfer those characteristics to lower-volume centres.

A recent study from 2012 concluded that higher volume surgeons perform partial nephrectomy more often, show a lower complication rate and may have a lower in-hospital mortality rate than lower volume surgeons²⁴.

Another study from last year, this time into bladder cancer, concluded that ninety-day cumulative mortality after cystectomy for bladder cancer was significant and may be associated with hospital cystectomy volume²¹.

A further study from 2012 stated that after adjustment for patient and disease characteristics, the relationship between surgeon volume and survival after radical cystectomy is accounted for by hospital volume²⁵. It concluded that, in contrast, hospital volume remained an independent predictor of survival, suggesting that structure and process characteristics of high volume hospitals drive long-term outcomes after radical cystectomy.

The overwhelming majority of the literature on the effect of the volume-outcome relationship in urological cancer is with regard to radical prostatectomy.

4. The volume-outcome relationship in radical prostatectomy (RP)

A 2000 US study concluded that hospital volumes are inversely related to in-hospital mortality, length of stay and total hospital charges after radical prostatectomy⁴.

A study from 2007 noted that as a surgeon's experience increases, cancer control after radical prostatectomy improves, and speculated that this was because of improved surgical technique¹⁰.

A study the following year concluded that increasing hospital and surgeon volume were associated with a decreased risk of most complications after radical prostatectomy¹².

A review of the literature published in 2008 stated that higher provider volumes are associated with better outcomes after radical prostatectomy¹³. It advocated a greater understanding of factors leading to this volume-outcome relationship, and research into the potential benefits and harms of increased regionalisation.

In 2009, a study was published that concluded that increasing surgical experience was associated with substantial reductions in cancer recurrence after laparoscopic radical prostatectomy, but that improvements in outcome seemed to accrue more slowly than for open surgery¹⁴.

An international multicentre study concluded that the learning curve for surgical margins after laparoscopic radical prostatectomy reaches a plateau at approximately 200 to 250 cases¹⁶. It also noted that prior open experience and surgeon generation did not improve the margin rate, suggesting that the rate was primarily a function of specifically laparoscopic training and experience.

An English study from 2010 showed a significant inverse correlation between provider volume (hospital and surgeon) and outcome (in-hospital mortality and hospital stay) for radical prostatectomy¹⁷. It concluded that this supported the centralisation of care for complex radical procedures, including radical prostatectomy.

A 2010 review concluded that, across multiple outcome metrics, there is a pervasive association between higher hospital radical prostatectomy case volume and improved outcomes¹⁸. It suggested that increasing individual surgeon volume may also portend better outcomes, not only perioperatively, but even with respect to long-term cancer control and urinary function. The authors noted that the studies reviewed showed an impressive magnitude of effect and demonstrated an impact on outcome that was proportional to surgical volume.

A study in a single hospital institution showed that significant heterogeneity in functional outcomes existed between surgeons after RP¹⁹. It showed that, contrary to hypothesis, functional preservation

does not appear to come at the expense of cancer control; rather, both are related to surgical quality.

A study of RP at academic versus non-academic institutions showed that, even after adjusting for annual hospital caseload, radical prostatectomy performed at academic institutions is associated with better outcomes than radical prostatectomy performed at non-academic institutions²⁰.

A European study from 2012 showed that patients undergoing robotic assisted RP compared with open RP were less likely to receive a blood transfusion, to experience an intraoperative complication or a postoperative complication, or have a prolonged length of stay²².

A head to head comparison of the effect of hospital volume versus surgeon volume on outcomes following RP showed that both are strongly correlated with postoperative outcomes following RP²³. The study suggested however that hospital volume matters more than surgical volume, especially for older and sicker individuals, who are at high-risk of complications.

A US comparison of robotic assisted RP (RARP) versus open RP (ORP) showed that overall robotic assisted RP patients experienced lower rates of adverse outcomes than open RP patients²⁶. It concluded that across equivalent volume quartiles, robotic assisted RP outcomes were generally favourable. Nonetheless, it also concluded that low volume institutions (average 26.2 RARP and 5 ORP cases) experienced inferior outcomes relative to very high volume centres (average 579 RARP and 151 ORP cases) irrespective of approach.

A 2012 study on the effect of surgeon and hospital volume on RP costs showed that selective referral to high volume radical prostatectomy surgeons operating at intermediate and high volume hospitals nets significant cost savings²⁷. However, higher radical prostatectomy hospital volume was associated with greater costs for low and intermediate volume radical prostatectomy surgeons.

In addition, a further 2012 US study concluded that higher volume hospitals showed fewer complications and lower costs than low volume hospitals on a national basis²⁸. It concluded that these findings supported referral to high volume centres for robot-assisted laparoscopic radical prostatectomy to decrease complications and costs.

1	Should Operations be Regionalized? The Empirical Relation between Surgical Volume and Mortality
Author(s)	Harold S. Luft, PhD, John P. Bunker, MD, and Alain C. Enthoven, PhD
Journal	The New England Journal of Medicine 1979;301:1364–1369
Filename	1979_NEJM_Luft et al
Abstract	<p>This study examines mortality rates for 12 surgical procedures of varying complexity in 1498 hospitals to determine whether there is a relation between a hospital's surgical volume and its surgical mortality. The mortality of open-heart surgery, vascular surgery, transurethral resection of the prostate, and coronary bypass decreased with increasing number of operations. Hospitals in which 200 or more of these operations were done annually had death rates, adjusted for case mix, 25 to 41 per cent lower than hospitals with lower volumes. For other procedures, the mortality curve flattened at lower volumes. For example, hospitals doing 50 to 100 total hip replacements attained a mortality rate for this procedure almost as low as that of hospitals doing 200 or more. Some procedures, such as cholecystectomy, showed no relation between volume and mortality. The results may reflect the effect of volume or experience on mortality, or referrals to institutions with better outcomes, as well as a number of other factors, such as patient selection. Regardless of the explanation, these data support the value of regionalization for certain operations.</p>

2	Impact of hospital volume on operative mortality for major cancer surgery
Author(s)	Begg CB, Cramer LD, Hoskins WJ, Brennan MF
Journal	The Journal of the American Medical Association, November 25, 1998 – Vol 280, No. 20
Filename	1998_JAMA_Begg et al
Abstract	<p>Context: Hospitals that treat a relatively high volume of patients for selected surgical oncology procedures report lower surgical in-hospital mortality rates than hospitals with a low volume of the procedures, but the reports do not take into account length of stay or adjust for case mix.</p> <p>Objective: To determine whether hospital volume was inversely associated with 30-day operative mortality, after adjusting for case mix.</p> <p>Design AND SETTING: Retrospective cohort study using the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database in which the hypothesis was prospectively specified. Surgeons determined in advance the surgical oncology procedures for which the experience of treating a larger volume of patients was most likely to lead to the knowledge or technical expertise that might offset surgical fatalities.</p> <p>Patients: All 5013 patients in the SEER registry aged 65 years or older at cancer diagnosis who underwent pancreatectomy, esophagectomy, pneumonectomy, liver resection, or pelvic exenteration, using incident cancers of the pancreas, esophagus, lung, colon, and rectum, and various genitourinary cancers diagnosed between 1984 and 1993.</p> <p>Main outcome measure: Thirty-day mortality in relation to procedure volume, adjusted for comorbidity, patient age, and cancer stage.</p> <p>Results: Higher volume was linked with lower mortality for pancreatectomy (P=.004), esophagectomy (P<.001), liver resection (P=.04), and pelvic exenteration (P=.04), but not for pneumonectomy (P=.32). The most striking results were for esophagectomy, for which the operative mortality rose to 17.3% in low-volume hospitals, compared with 3.4% in high-volume hospitals, and for pancreatectomy, for which the corresponding rates were 12.9% vs 5.8%. Adjustments for case mix and other patient factors did not change the finding that low volume was strongly associated with excess mortality.</p> <p>Conclusions: These data support the hypothesis that when complex surgical oncologic procedures are provided by surgical teams in hospitals with specialty expertise, mortality rates are lower.</p>

3	Hospital and Physician Volume or Specialization and Outcomes in Cancer Treatment: Importance in Quality of Cancer Care
Author(s)	Bruce E. Hillner, Thomas J. Smith, and Christopher E. Desch
Journal	Journal of Clinical Oncology, Vol 18, No 11 (June), 2000: pp 2327-2340
Filename	2000_JCO_Hillner et al
Abstract	<p>Purpose: To conduct a comprehensive review of the health services literature to search for evidence that hospital or physician volume or specialty affects the outcome of cancer care.</p> <p>Methods: We reviewed the 1988 to 1999 MEDLINE literature that considered the hypothesis that higher volume or specialization equals better outcome in processes or outcomes of cancer treatments.</p> <p>Results: An extensive, consistent literature that supported a volume-outcome relationship was found for cancers treated with technologically complex surgical procedures, eg, most intra-abdominal and lung cancers. These studies predominantly measured in-hospital or 30-day mortality and used the hospital as the unit of analysis. For cancer primarily treated with low-risk surgery, there were fewer studies. An association with hospital and surgeon volume in colon cancer varied with the volume threshold. For breast cancer, British studies found that physician specialty and volume were associated with improved long-term outcomes, and the single American report showed an association between hospital volume of initial surgery and better 5-year survival. Studies of nonsurgical cancers, principally lymphomas and testicular cancer, were few but consistently showed better long-term outcomes associated with larger hospital volume or specialty focus. Studies in recurrent or metastatic cancer were absent. Across studies, the absolute benefit from care at high-volume centers exceeds the benefit from break-through treatments.</p> <p>Conclusion: Although these reports are all retrospective, rely on registries with dated data, rarely have predefined hypotheses, and may have publication and self-interest biases, most support a positive volume outcome relationship in initial cancer treatment. Given the public fear of cancer, its well-defined first identification, and the tumor-node-metastasis taxonomy, actual cancer care should and can be prospectively measured, assessed, and benchmarked. The literature suggests that, for all forms of cancer, efforts to concentrate its initial care would be appropriate.</p>

4	The Effect of Hospital Volume on Mortality and Resource Use After Radical Prostatectomy
Author(s)	Lars M. Ellison, John A. Heaney and John D. Birkmeyer
Journal	The Journal of Urology Vol. 163, 867–869, March 2000
Filename	2000_JUrol_Ellison et al
Abstract	<p>Purpose: The value of radical prostatectomy for patients with prostate cancer depends on low morbidity and mortality. We assessed whether patient outcome is associated with how many of these procedures are performed at hospitals yearly.</p> <p>Materials and Methods: Using the Nationwide Inpatient Sample, which is a stratified probability sample of American hospitals, we identified 66,693 men who underwent radical prostatectomy between 1989 and 1995. Cases were categorized into volume groups according to hospital annual rate of radical prostatectomies performed, including low—fewer than 25, medium—25 to 54 and high—greater than 54. We performed multivariate logistic regression to control for patient characteristics when assessing the associations of hospital volume, in-hospital mortality and resource use.</p> <p>Results: Overall adjusted in-hospital mortality after radical prostatectomy was relatively low (0.25%). However, patients at low volume centers were 78% more likely to have in-hospital mortality than those at high volume centers (adjusted odds ratio 1.78, 95% confidence interval 1.7 to 2.6). Overall length of stay decreased at all hospitals between 1989 and 1995. However, average length of stay was longer and total hospital charges were higher at low than at high volume centers (7.3 versus 6.1 days, $p < 0.0001$, and \$15,600 versus \$13,500, $p < 0.0001$, respectively).</p> <p>Conclusions: Hospital volumes inversely related to in-hospital mortality, length of stay and total hospital charges after radical prostatectomy. Further study is necessary to examine the association of hospital volume with other important outcomes, including incontinence, impotence and long-term patient survival after radical prostatectomy.</p>

5	Is Volume Related to Outcome in Health Care? A Systematic Review and Methodologic Critique of the Literature
Author(s)	Ethan A. Halm, MD, MPH; Clara Lee, MD, MPP; and Mark R. Chassin, MD, MPP, MPH
Journal	Annals of Internal Medicine 2002;137:511-520
Filename	2002_AIM_Halm et al
Abstract	<p>Purpose: To systematically review the methodologic rigor of the research on volume and outcomes and to summarize the magnitude and significance of the association between them.</p> <p>Data Sources: The authors searched MEDLINE from January 1980 to December 2000 for English-language, population-based studies examining the independent relationship between hospital or physician volume and clinical outcomes. Bibliographies were reviewed to identify other articles of interest, and experts were contacted about missing or unpublished studies.</p> <p>Study Selection: Of 272 studies reviewed, 135 met inclusion criteria and covered 27 procedures and clinical conditions.</p> <p>Data Extraction: Two investigators independently reviewed each article, using a standard form to abstract information on key study characteristics and results.</p> <p>Data Synthesis: The methodologic rigor of the primary studies varied. Few studies used clinical data for risk adjustment or examined effects of hospital and physician volume simultaneously. Overall, 71% of all studies of hospital volume and 69% of studies of physician volume reported statistically significant associations between higher volume and better outcomes. The strongest associations were found for AIDS treatment and for surgery on pancreatic cancer, esophageal cancer, abdominal aortic aneurysms, and pediatric cardiac problems (a median of 3.3 to 13 excess deaths per 100 cases were attributed to low volume). Although statistically significant, the volume–outcome relationship for coronary artery bypass surgery, coronary angioplasty, carotid endarterectomy, other cancer surgery, and orthopedic procedures was of much smaller magnitude. Hospital volume–outcome studies that performed risk adjustment by using clinical data were less likely to report significant associations than were studies that adjusted for risk by using administrative data.</p> <p>Conclusions: High volume is associated with better outcomes across a wide range of procedures and conditions, but the magnitude of the association varies greatly. The clinical and policy significance of these findings is complicated by the methodologic shortcomings of many studies. Differences in case mix and processes of care between high- and low-volume providers may explain part of the observed relationship between volume and outcome.</p>

6	A Systematic Review and Critique of the Literature Relating Hospital or Surgeon Volume to Health Outcomes for 3 Urological Cancer Procedures
Author(s)	Martin Nuttall, Jan Van Der Meulen, Nirree Phillips, Carlos Sharpin, David Gillatt, Gregor McIntosh and Mark Emberton
Journal	The Journal of Urology Vol. 172, 2145–2152, December 2004
Filename	2004_JUrol_Nuttall et al
Abstract	<p>Purpose: We performed a systematic review and critique of the literature of the relationship between hospital or surgeon volume and health outcomes in patients undergoing radical surgery for cancer of the bladder, kidney or prostate.</p> <p>Materials and Methods: Four electronic databases were searched to identify studies that describe the relationship between hospital or surgeon volume and health outcomes.</p> <p>Results: All included studies were performed in North America. A total of 12 studies were found that related hospital volume to outcomes. For radical prostatectomy and cystectomy all 8 included studies showed improvement in at least 1 outcome measure with increasing volume and never deterioration. For nephrectomy the 4 included studies produced conflicting results. Four studies were found that related surgeon volume to outcomes. All radical prostatectomy and cystectomy studies showed that some outcomes were better with higher surgeon volume and never deterioration. We did not find any studies of the effect of surgeon volume on outcomes after nephrectomy. The 3 studies of the combined effect of hospital and surgeon volume on outcomes after radical prostatectomy or cystectomy suggest that high volume hospitals have better outcomes, in part because of the effect of surgeon volume and vice versa.</p> <p>Conclusions: Outcomes after radical prostatectomy and cystectomy are on average likely to be better if these procedures are performed by and at high volume providers. For radical nephrectomy the evidence is unclear. The impact of volume based policies (increasing volume to improve outcomes) depends on the extent to which “practice makes perfect” explains the observed results. Further studies should explicitly address selective referral and confounding as alternative explanations. Longitudinal studies should be performed to evaluate the impact of volume based policies</p>

7	The Volume/Outcome Relationship in Urologic Cancer Surgery
Author(s)	Fadi N. Joudi, Badrinath R. Konety
Journal	Supportive Cancer Therapy, Volume 2, Number 1 , October 2004
Filename	2004_SCT_Joudi & Konety
Abstract	<p>There is growing evidence in the literature of the association between higher hospital and surgeon volume and better outcomes from high-risk surgical procedures. A Medline search of the literature from 1966 to 2004 was performed using the keywords "outcome," "urology," "neoplasms," "volume," "hospital volume," "surgeon volume," "prostatectomy," "cystectomy," "nephrectomy," "prostate cancer," "bladder cancer," "kidney cancer," and "testis cancer." The relevant articles were reviewed and discussed in reference to each urologic cancer. Several studies have shown that higher hospital volume is associated with better outcomes for all urologic cancer surgeries. An association between postoperative mortality/morbidity and hospital and surgeon volumes was established. Individual surgeon volume is also a predictor of the quality and completeness of certain procedures such as radical prostatectomy. Long-term survival from cancer such as testicular cancer can be impacted by provider and institution volume. The evidence that high volume hospitals have better outcomes from various types of urologic cancer surgery is increasing. The ultimate implication of these studies is that centralizing health care may yield better outcomes from urologic cancer surgeries. This is controversial and will have major health policy implications. Another approach would be to determine key factors that are the drivers behind better outcomes at high-volume centers and attempt to transfer those characteristics to lower-volume centers, thereby improving outcomes globally across all volume levels.</p>

8	Provider volume and outcomes for oncological procedures
Author(s)	S.D. Killeen, M. J.O’Sullivan, J. C. Coffey, W.O. Kirwan and H. P. Redmond
Journal	British Journal of Surgery 2005; 92: 389–402
Filename	2005_BJS_Killeen et al
Abstract	<p>Background: Oncological procedures may have better outcomes if performed by high-volume providers.</p> <p>Methods: A review of the English language literature incorporating searches of the Medline, Embase and Cochrane collaboration databases was performed. Studies were included if they involved a patient cohort from 1984 onwards, were community or population based, and assessed health outcome as a dependent variable and volume as an independent variable. The studies were also scored quantifiably to assess generalizability with respect to any observed volume–outcome relationship and analysed according to organ system; numbers needed to treat were estimated where possible.</p> <p>Results: Sixty-eight relevant studies were identified and a total of 41 were included, of which 13 were based on clinical data. All showed either an inverse relationship, of variable magnitude, between provider volume and mortality, or no volume–outcome effect. All but two clinical reports revealed a statistically significant positive relationship between volume and outcome; none demonstrated the opposite.</p> <p>Conclusion: High-volume providers have a significantly better outcome for complex cancer surgery, specifically for pancreatectomy, oesophagectomy, gastrectomy and rectal resection.</p>

9	Trends in Hospital and Surgeon Volume and Operative Mortality for Cancer Surgery
Author(s)	Vivian Ho, PhD, Martin J. Heslin, MD, Huifeng Yun, MSc, and Lee Howard, BS
Journal	Annals of Surgical Oncology, 13(6): 851)858
Filename	2006_ASO_Ho et al
Abstract	<p>Background: We measured 13-year trends in operative mortality for six cancer resections. We then examined whether these trends are driven by changes in hospital and surgeon volume or by changes that occurred among all providers, regardless of volume.</p> <p>Methods: We analyzed administrative discharge data on patients who received one of six cancer resections in Florida, New Jersey, and New York for three time periods: 1988 to 1991, 1992 to 1996, and 1997 to 2000. Descriptive statistics and nested regression models were used to test for changes in the association between inpatient mortality and annual hospital and annual surgeon volume over time, adjusting for patient and hospital characteristics.</p> <p>Results: Unadjusted inpatient mortality rates for the six cancer resections declined between .8 and 4.0 percentage points between the time periods 1988 to 1991 and 1997 to 2000. Over this time period, annual hospital and surgeon volumes for the six cancer operations increased an average of 24.3% and 24.2%, respectively. The logistic regressions indicated a relatively stable relationship over time between both increased hospital and surgeon volume and lower inpatient mortality. Simulations suggest that increases in hospital and surgeon procedure volume over time led to a reduction in inpatient mortality ranging from .1 percentage points for rectal cancer to 2.3 percentage points for pneumonectomy.</p> <p>Conclusions: Persistence of the volume-outcome relation and increasing hospital and surgeon volumes explain much of the decline over time in inpatient mortality for five of the six cancer operations studied. Concentrating cancer resections among high-volume providers should lead to further reduced inpatient mortality.</p>

10	The Surgical Learning Curve for Prostate Cancer Control After Radical Prostatectomy
Author(s)	Andrew J . Vickers , Fernando J . Bianco , Angel M . Serio , James A . Eastham , Deborah Schrag , Eric A . Klein , Alwyn M . Reuther , Michael W . Kattan , J. Edson Pontes , Peter T . Scardino
Journal	Journal of the National Cancer Institute Vol. 99, Issue 15, August 1, 2007
Filename	2007_JNCI_Vickers et al
Abstract	<p>Background: The learning curve for surgery — i.e., improvement in surgical outcomes with increasing surgeon experience — remains primarily a theoretical concept; actual curves based on surgical outcome data are rarely presented. We analyzed the surgical learning curve for prostate cancer recurrence after radical prostatectomy.</p> <p>Methods: The study cohort included 7765 prostate cancer patients who were treated with radical prostatectomy by one of 72 surgeons at four major US academic medical centers between 1987 and 2003. For each patient, surgeon experience was coded as the total number of radical prostatectomies performed by the surgeon before the patient ' s operation. Multivariable survival – time regression models were used to evaluate the association between surgeon experience and prostate cancer recurrence, defined as a serum prostate specific antigen (PSA) of more than 0.4 ng/mL followed by a subsequent higher PSA level (i.e., bio - chemical recurrence), with adjustment for established clinical and tumor characteristics. All P values are two-sided.</p> <p>Results: The learning curve for prostate cancer recurrence after radical prostatectomy was steep and did not start to plateau until a surgeon had completed approximately 250 prior operations. The predicted probabilities of recurrence at 5 years were 17.9% (95% confidence interval [CI] = 12.1% to 25.6%) for patients treated by surgeons with 10 prior operations and 10.7% (95% CI = 7.1% to 15.9%) for patients treated by surgeons with 250 prior operations (difference = 7.2%, 95% CI = 4.6% to 10.1%; P <.001). This finding was robust to sensitivity analysis; in particular, the results were unaffected if we restricted the sample to patients treated after 1995, when stage migration related to the advent of PSA screening appeared largely complete.</p> <p>Conclusions: As a surgeon's experience increases, cancer control after radical prostatectomy improves, presumably because of improved surgical technique. Further research is needed to examine the specific techniques used by experienced surgeons that are associated with improved outcomes.</p>

11	Directing Surgical Quality Improvement Initiatives: Comparison of Perioperative Mortality and Long-Term Survival for Cancer Surgery
Author(s)	Karl Y. Bilimoria, David J. Bentrem, Joseph M. Feinglass, Andrew K. Stewart, David P. Winchester, Mark S. Talamonti, and Clifford Y. Ko
Journal	Journal of Clinical Oncology 26:4626-4633, 2008
Filename	2008_JClinOnc_Bilimoria et al
Main conclusion	<p>Purpose: Quality-improvement initiatives are being developed to decrease volume-based variability in surgical outcomes. Resources for national and hospital quality-improvement initiatives are limited. It is unclear whether quality initiatives in surgical oncology should focus on factors affecting perioperative mortality or long-term survival. Our objective was to determine whether differences in hospital surgical volume have a larger effect on perioperative mortality or long-term survival using two methods.</p> <p>Patients and Methods: From the National Cancer Data Base, 243,103 patients who underwent surgery for nonmetastatic colon, esophageal, gastric, liver, lung, pancreatic, or rectal cancer were identified. Multivariable modeling was used to evaluate 60-day mortality and 5-year conditional survival (excluding perioperative deaths) across hospital volume strata. The number of potentially avoidable perioperative and long-term deaths were calculated if outcomes at low-volume hospitals were improved to those of the highest-volume hospitals.</p> <p>Results: Risk-adjusted perioperative mortality and long-term conditional survival worsened as hospital surgical volume decreased for all cancer sites, except for liver resections where there was no difference in survival. When comparing low- with high-volume hospitals, the hazard ratios for perioperative mortality were substantially larger than for long-term survival. However, the number of potentially avoidable deaths each year in the United States, if outcomes at low-volume hospitals were improved to the level of highest volume centers, was significantly larger for long-term survival.</p> <p>Conclusion: Although the magnitude of the hazard ratios implies that quality-improvement efforts should focus on perioperative mortality, a larger number of deaths could be avoided by focusing quality initiatives on factors associated with long-term survival.</p>
Other conclusions	<p>There are large disparities in perioperative mortality between lowest- and highest-volume centers. This implies that there are significant lessons that can be learned from the way high-volume hospitals care for patients in the perioperative period. The differences in long-term survival between high- and low-volume hospitals may appear marginal when examining the hazard ratios; however, we found that the absolute number of potentially avoidable deaths was considerably larger long-term. Thus, small improvements in factors affecting long term outcomes will potentially affect a larger number of patients and save more lives.</p> <p>Rather than regionalizing or centralizing care for all complex cancer resections, identifying hospital structural characteristics and processes of care affecting outcomes and transference to low-volume centers represents a mechanism to improve outcomes for most cancer resections at lower-volume hospitals</p>

12	Impact of hospital and surgeon volume on mortality and complications after prostatectomy
Author(s)	Alibhai SM, Leach M, Tomlinson G.
Journal	The Journal of Urology 2008 Jul;180(1):155-62
Filename	2008_JUrol_Alibhai et al
Abstract	<p>Purpose: It remains controversial whether short-term surgical complications after radical prostatectomy can be decreased by increasing surgeon or hospital procedural volume. We determined whether hospital or surgeon volumes impacted various short-term surgical complications.</p> <p>Materials and methods: We examined in-hospital mortality and complications following radical prostatectomy in all 25,404 men who underwent this surgery across 8 provinces in Canada between 1990 and 2001. Bayesian multilevel logistic regression models were used, adjusting for patient age, comorbidity, surgery year, and hospital and surgeon volume, while accounting for clustering by surgeon and hospital.</p> <p>Results: Overall 50 men (0.2%) died and 5,087 (20.0%) had 1 or more in-hospital complications following surgery. In models adjusted for age, comorbidity and surgery year hospital volume was associated with in-hospital mortality ($p = 0.037$). In adjusted models doubling hospital volume was associated with a decreased risk of any, cardiac, respiratory, vascular, genitourinary, miscellaneous medical and miscellaneous surgical complications (each $p < 0.001$), although not wound/bleeding complications ($p = 0.40$). Similarly doubling surgical volume was associated with a decreased risk of any, respiratory, wound/bleeding, genitourinary, miscellaneous medical and miscellaneous surgical complications (each $p < 0.01$), although not cardiac and vascular complications ($p = 0.58$ and 0.17, respectively). Adjustment for clustering led to nonsignificant effects of hospital volume on miscellaneous surgical complications, and of surgeon volume on miscellaneous medical and miscellaneous surgical complications. However, this did not alter other findings.</p> <p>Conclusions: Increasing hospital and surgeon volume are associated with a decreased risk of most complications after radical prostatectomy even after adjusting for the effects of clustering.</p>

13	Association Between Hospital and Surgeon Radical Prostatectomy Volume and Patient Outcomes: A Systematic Review
Author(s)	Timothy J. Wilt, Tatyana A. Shamliyan, Brent C. Taylor, Roderick MacDonald and Robert L. Kane
Journal	The Journal of Urology Vol. 180, 820-829, September 2008
Filename	2008_JUrol_Wilt et al
Abstract	<p>Purpose: We examined the association between hospital and surgeon volume, and patient outcomes after radical prostatectomy.</p> <p>Materials and Methods: Databases were searched from 1980 to November 2007 to identify controlled studies published in English. Information on study design, hospital and surgeon annual radical prostatectomy volume, hospital status and patient outcome rates were abstracted using a standardized protocol. Data were pooled with random effects models.</p> <p>Results: A total of 17 original investigations reported patient outcomes in categories of hospital and/or surgeon annual number of radical prostatectomies, and met inclusion criteria. Hospitals with volumes above the mean (43 radical prostatectomies per year) had lower surgery related mortality (rate of difference 0.62, 95% CI 0.47–0.81) and morbidity (rate difference 9.7%, 95% CI 15.8, 3.6). Teaching hospitals had an 18% (95% CI 26, 9) lower rate of surgery related complications. Surgeon volume was not significantly associated with surgery related mortality or positive surgical margins. However, the rate of late urinary complications was 2.4% lower (95% CI 5, 0.1) and the rate of long-term incontinence was 1.2% lower (95% CI 2.5, 0.1) for each 10 additional radical prostatectomies performed by the surgeon annually. Length of stay was lower, corresponding to surgeon volume.</p> <p>Conclusions: Higher provider volumes are associated with better outcomes after radical prostatectomy. Greater understanding of factors leading to this volume-outcome relationship, and the potential benefits and harms of increased regionalization is needed.</p>

14	The surgical learning curve for laparoscopic radical prostatectomy: a retrospective cohort study
Author(s)	Andrew J Vickers, Caroline J Savage, Marcel Hruza, Ingolf Tuerk, Philippe Koenig, Luis Martínez-Piñeiro, Gunther Janetschek, Bertrand Guillionneau
Journal	Lancet Oncology 2009; 10: 475–80
Filename	2009_LancetOnc_Vickers et al
Abstract	<p>Background: We previously reported the learning curve for open radical prostatectomy, reporting large decreases in recurrence rates with increasing surgeon experience. Here we aim to characterise the learning curve for laparoscopic radical prostatectomy.</p> <p>Methods: We did a retrospective cohort study of 4702 patients with prostate cancer treated laparoscopically by one of 29 surgeons from seven institutions in Europe and North America between January, 1998, and June, 2007. Multivariable models were used to assess the association between surgeon experience at the time of each patient’s operation and prostate-cancer recurrence, with adjustment for established predictors.</p> <p>Findings: After adjusting for case mix, greater surgeon experience was associated with a lower risk of recurrence ($p=0.0053$). The 5-year risk of recurrence decreased from 17% to 16% to 9% for a patient treated by a surgeon with 10, 250, and 750 prior laparoscopic procedures, respectively (risk difference between 10 and 750 procedures 8.0%, 95% CI 4.4–12.0). The learning curve for laparoscopic radical prostatectomy was slower than the previously reported learning curve for open surgery ($p<0.001$). Surgeons with previous experience of open radical prostatectomy had significantly poorer results than those whose first operation was laparoscopic (risk difference 12.3%, 95% CI 8.8–15.7).</p> <p>Interpretation: Increasing surgical experience is associated with substantial reductions in cancer recurrence after laparoscopic radical prostatectomy, but improvements in outcome seem to accrue more slowly than for open surgery. Laparoscopic radical prostatectomy seems to involve skills that do not translate well from open radical prostatectomy.</p>

15	Variation in Hospital Mortality Associated with Inpatient Surgery
Author(s)	Amir A. Ghaferi, M.D., John D. Birkmeyer, M.D., and Justin B. Dimick, M.D., M.P.H.
Journal	The New England Journal of Medicine 2009;361:1368-75
Filename	2009_NEJM_Ghaferi et al
Abstract	<p>Background: Hospital mortality that is associated with inpatient surgery varies widely. Reducing rates of postoperative complications, the current focus of payers and regulators, may be one approach to reducing mortality. However, effective management of complications once they have occurred may be equally important.</p> <p>Methods: We studied 84,730 patients who had undergone inpatient general and vascular surgery from 2005 through 2007, using data from the American College of Surgeons National Surgical Quality Improvement Program. We first ranked hospitals according to their risk-adjusted overall rate of death and divided them into five groups. For hospitals in each overall mortality quintile, we then assessed the incidence of overall and major complications and the rate of death among patients with major complications.</p> <p>Results: Rates of death varied widely across hospital quintiles, from 3.5% in very-low-mortality hospitals to 6.9% in very-high-mortality hospitals. Hospitals with either very high mortality or very low mortality had similar rates of overall complications (24.6% and 26.9%, respectively) and of major complications (18.2% and 16.2%, respectively). Rates of individual complications did not vary significantly across hospital mortality quintiles. In contrast, mortality in patients with major complications was almost twice as high in hospitals with very high overall mortality as in those with very low overall mortality (21.4% vs. 12.5%, $P < 0.001$). Differences in rates of death among patients with major complications were also the primary determinant of variation in overall mortality with individual operations.</p> <p>Conclusions: In addition to efforts aimed at avoiding complications in the first place, reducing mortality associated with inpatient surgery will require greater attention to the timely recognition and management of complications once they occur.</p>
Other conclusions	The ability to effectively rescue a patient from a complication relies on two distinct points of intervention: the timely recognition of a complication and the effective management of that complication. The former relies on an efficient, collaborative team with established and effective systems of communication. In addition to timely recognition, the effective management of complications is also crucial. This management includes multiple complex processes, including the timely administration of antibiotics in patients with sepsis, the rapid transfer of a patient to an intensive care unit (ICU), and the availability of interventional cardiologists during an acute myocardial infarction.

16	The Learning Curve for Laparoscopic Radical Prostatectomy: An International Multicenter Study
Author(s)	Fernando P. Secin, Caroline Savage, Claude Abbou, Alexandre de La Taille, Laurent Salomon, Jens Rassweiler, Marcel Hruza, François Rozet, Xavier Cathelineau, Gunther Janetschek, Faissal Nassar, Ingolf Turk, Alex J. Vanni, Inderbir S. Gill, Philippe Koenig, Jihad H. Kaouk, Luis Martinez Pineiro, Vito Pansadoro, Paolo Emiliozzi, Anders Bjartell, Thomas Jiborn, Christopher Eden, Andrew J. Richards, Roland Van Velthoven, Jens-Uwe Stolzenburg, Robert Rabenalt, Li-Ming Su, Christian P. Pavlovich, Adam W. Levinson, Karim A. Touijer, Andrew Vickers and Bertrand Guillonneau
Journal	The Journal of Urology, Vol. 184, 2291-2296, December 2010
Filename	2010_JUrol_Secin et al
Abstract	<p>Purpose: It is not yet possible to estimate the number of cases required for a beginner to become expert in laparoscopic radical prostatectomy. We estimated the learning curve of laparoscopic radical prostatectomy for positive surgical margins compared to a published learning curve for open radical prostatectomy.</p> <p>Materials and Methods: We reviewed records from 8,544 consecutive patients with prostate cancer treated laparoscopically by 51 surgeons at 14 academic institutions in Europe and the United States. The probability of a positive surgical margin was calculated as a function of surgeon experience with adjustment for pathological stage, Gleason score and prostate specific antigen. A second model incorporated prior experience with open radical prostatectomy and surgeon generation.</p> <p>Results: Positive surgical margins occurred in 1,862 patients (22%). There was an apparent improvement in surgical margin rates up to a plateau at 200 to 250 surgeries. Changes in margin rates once this plateau was reached were relatively minimal relative to the CIs. The absolute risk difference for 10 vs 250 prior surgeries was 4.8% (95% CI 1.5, 8.5). Neither surgeon generation nor prior open radical prostatectomy experience was statistically significant when added to the model. The rate of decrease in positive surgical margins was more rapid in the open vs laparoscopic learning curve.</p> <p>Conclusions: The learning curve for surgical margins after laparoscopic radical prostatectomy plateaus at approximately 200 to 250 cases. Prior open experience and surgeon generation do not improve the margin rate, suggesting that the rate is primarily a function of specifically laparoscopic training and experience.</p>

17	Radical Prostatectomy Practice in England
Author(s)	Vishwanath S Hanchanale, John E McCabe, Pradip Javlé
Journal	Urology Journal 2010;7:243-8
Filename	2010_UroIJ_Hanchanale et al
Abstract	<p>Purpose: As there is paucity of data on radical prostatectomy (RP) as a primary treatment for patients with localized prostate cancer, we analysed the trends in the RP practice in England.</p> <p>Materials and Methods: This study was carried out on 14 300 patients who underwent RP for carcinoma of the prostate. Database was prepared from hospital episode statistics of the Department of Health in England. National trends in RP practice were summarized as well as volume outcome analysis.</p> <p>Results: Annual number of RPs exponentially increased from 972 (1998 to 1999) to 3092 (2004 to 2005). Laparoscopic RPs increased from 2 to 257 over the study period. Median waiting duration increased by more than 10 days (13 days). Significant decrease in median length of hospital stay from 8 (range, 7 to 10) days to 6 (range, 5 to 8) days was observed ($P < .001$). More than 90% mortality was seen in patients of ≥ 60 years of age. Significant inverse correlation was found between the hospital volume (Odds Ratio: 0.40) and in-hospital mortality rate following RP. High volume surgeons (≥ 16) and high volume hospitals (≥ 26) had significantly lower mortality (Odds Ratio: 0.32) and shorter in-hospital stay in comparison to low volume surgeons and hospitals.</p> <p>Conclusion: There is an exponential increase in the number of RPs with an increasing trend towards laparoscopic RP in England. This study showed a significant inverse correlation between provider volume (hospital and surgeon) and outcome (in-hospital mortality and hospital stay) for RP in England; thus, supporting the recommendations for centralization of care for complex radical procedures, including RP.</p>

18	Impact of surgeon and hospital volume on outcomes of radical prostatectomy
Author(s)	Daniel A. Barocas, M.D., Robert Mitchell, M.D., Sam S. Chang, M.D., Michael S. Cookson, M.D.
Journal	Urologic Oncology 28 (2010) 243–250
Filename	2010_UrolOnc_Barocas et al
Abstract	<p>An emerging body of literature has established a relationship between case volume and outcomes after radical prostatectomy (RP). Such findings come in the context of an already well-established association between both surgeon and hospital case volume in the field of cardiovascular surgery and for several high-risk cancer operations. The purpose of this review is to identify and summarize the seminal studies to date that investigate the impact of RP volume on patient outcomes.</p> <p>We performed a literature search of the English language studies available through PubMed that pertain to this topic. Thirteen original studies and a meta-analysis were found, which focus on the impact of hospital RP volume on surgical outcomes (including length of stay, perioperative complication rate, perioperative mortality, readmission rate, and several long term measures of treatment effect). Eight studies were identified that interrogated the relationship between individual surgeon case volume and outcomes.</p> <p>Across multiple outcome metrics, there is a pervasive association between higher hospital RP case volume and improved outcomes. Increasing individual surgeon volume may also portend better outcomes, not only perioperatively, but even with respect to long-term cancer control and urinary function. While most data arise from retrospective cohort studies, these studies, for the most part, are of sound design, show an impressive magnitude of effect, and demonstrate an impact on outcome that is proportional to surgical volume.</p> <p>Further research should focus on finding a means by which to translate these observations into improvements in the quality of prostate cancer care. To address differences in outcome between low volume and high volume surgeons, some have proposed and implemented subspecialization within practice groups, while others have looked toward subspecialty certification for urologic oncologists. With regard to differences in hospital volume, regionalization of care has been proposed as a solution, but is fraught with pitfalls. It may be more pragmatic and, ultimately more beneficial to patients, however, to identify processes of care that are already in place at high volume hospitals and implement them at lower volume centers. Similarly, we advocate careful studies to identify successful surgical techniques of high volume surgeons and efforts to disseminate these techniques.</p>

19	Cancer Control and Functional Outcomes After Radical Prostatectomy as Markers of Surgical Quality: Analysis of Heterogeneity Between Surgeons at a Single Cancer Center
Author(s)	Andrew Vickers , Caroline Savage , Fernando Bianco , John Mulhall , Jaspreet Sandhu , Bertrand Guillonneau , Angel Cronin , Peter Scardino
Journal	European Urology 59 (2011) 317–322
Filename	2011_EUrol_Vickers et al
Abstract	<p>Background: Previous studies have shown that complications and biochemical recurrence rates after radical prostatectomy (RP) vary between different surgeons to a greater extent than might be expected by chance. Data on urinary and erectile outcomes, however, are lacking.</p> <p>Objective: In this study, we examined whether between-surgeon variation, known as heterogeneity, exists for urinary and erectile outcomes after RP.</p> <p>Design, setting, and participants: Our study consisted of 1910 RP patients who were treated by 1 of 11 surgeons between January 1999 and July 2007.</p> <p>Intervention: All patients underwent RP at Memorial Sloan-Kettering Cancer Center. Measurements: Patients were evaluated for functional outcome 1 yr after surgery. Multivariable random effects models were used to evaluate the heterogeneity in erectile or urinary outcome between surgeons, after adjustment for case mix (age, prostate-specific antigen, pathologic stage and grade, comorbidities) and year of surgery.</p> <p>Results and limitations: We found significant heterogeneity in functional outcomes after RP ($p < 0.001$ for both urinary and erectile function). Four surgeons had adjusted rates of full continence $<75\%$, whereas three had rates $>85\%$. For erectile function, two surgeons in our series had adjusted rates $<20\%$; another two had rates $>45\%$. We found some evidence suggesting that surgeons' erectile and urinary outcomes were correlated. Contrary to the hypothesis that surgeons "trade off" functional outcomes and cancer control, better rates of functional preservation were associated with lower biochemical recurrence rates.</p> <p>Conclusions: A patient's likelihood of recovering erectile and urinary function may differ depending on which of two surgeons performs his RP. Functional preservation does not appear to come at the expense of cancer control; rather, both are related to surgical quality.</p>
Other conclusions	We found an association between surgeons' annual volumes and patient outcomes. Surgeons with higher volumes had significantly better functional preservation than those with lower volumes ($p = 0.005$). For a patient with the mean level of all covariates, the predicted probability of experiencing recovery of both erectile and urinary function at 1 yr was 21% if treated by a surgeon with an annual volume of 25 cases; this probability increased to 47% if the surgeon had an annual volume of 100.

20	Radical Prostatectomy at Academic Versus Nonacademic Institutions: A Population Based Analysis
Author(s)	Quoc-Dien Trinh, Jan Schmitges, Maxine Sun, Shahrokh F. Shariat, Shyam Sukumar, Marco Bianchi, Zhe Tian, Claudio Jeldres, Jesse Sammon, Paul Perrotte, Markus Graefen, James O. Peabody, Mani Menon and Pierre I. Karakiewicz
Journal	The Journal of Urology Vol. 186, 1849-1854, November 2011
Filename	2011_JUrol_Trinh et al
Abstract	<p>Purpose: Radical prostatectomy outcomes may be better at academic institutions than at nonacademic centers. We examined the effect of academic status on 5 short-term radical prostatectomy outcomes.</p> <p>Materials and Methods: In the Health Care Utilization Project Nationwide Inpatient Sample we focused on radical prostatectomy performed within the 7 most contemporary years (2001 to 2007). We tested the rates of homologous blood transfusions and extended length of stay, as well as intraoperative and postoperative complications stratified according to institutional academic status. Multivariable logistic regression analyses further adjusted for confounding variables.</p> <p>Results: Overall 89,965 radical prostatectomies were identified, yielding a weighted national estimate of 442,811. Of those procedures 58.2% were recorded at academic institutions. Patients at academic institutions had a lower Charlson comorbidity index and more frequently had private insurance ($p < 0.001$). Radical prostatectomy at academic institutions was associated with fewer blood transfusions (5.4% vs 7.4%), fewer postoperative complications (10.1% vs 12.9%) and lower rates of hospital stay above the median (18.0% vs 28.2%). On multivariable analyses institutional academic status exerted a protective effect on postoperative complication rates (OR 0.93, $p = 0.02$) and on rates of hospital stay in excess of the median (OR 0.91, $p < 0.001$). Similarly radical prostatectomy performed at hospitals with a high annual caseload were less frequently associated with intraoperative (OR 0.8, $p = 0.01$) and postoperative (OR 0.63, $p < 0.001$) complications, length of stay beyond the median (OR 0.19, $p < 0.001$) and homologous blood transfusions (OR 0.35, $p < 0.001$).</p> <p>Conclusions: Even after adjusting for annual hospital caseload, radical prostatectomy performed at academic institutions is associated with better outcomes than radical prostatectomy performed at nonacademic institutions. This relationship illustrates averages and does not imply that academic institutions invariably offer better care.</p>

21	Hospital volume and 90-day mortality risk after radical cystectomy: a population-based cohort study
Author(s)	Michael P. Porter, John L. Gore, Jonathan L. Wright
Journal	World Journal of Urology (2011) 29:73–77
Filename	2011_WJUrol_Porter et al
Abstract	<p>Background: Hospital cystectomy volume has been associated with in-hospital perioperative mortality in previous studies. In this study, we examine the relationship between hospital cystectomy volume and 90-day mortality in a population-based cohort of patients undergoing cystectomy for bladder cancer.</p> <p>Methods: We performed a retrospective cohort study using population from the State of Washington Comprehensive Hospital Abstract Reporting System (CHARS) database. We examined the association between hospital cystectomy volume (categorized into volume tertiles) and cumulative 90-day mortality in patients undergoing cystectomy for bladder cancer. Multivariate regression was used to adjust for patient age, comorbid disease, year of surgery, and gender. Standard errors were clustered by discharge hospital.</p> <p>Results: We identified 823 patients who underwent cystectomy for bladder cancer at 39 unique hospitals in 2003–2007. The unadjusted cumulative 90-day cumulative mortality was 5.4, 6.9, and 8.4% for patients discharged from hospitals in the high, medium, and low volume tertiles, respectively (P = 0.35). In the multivariate analysis, the patients undergoing cystectomy who were discharged from hospitals in the highest volume tertile had a lower risk of death in the first 90 days postoperatively compared to patients discharged from hospitals in the low volume tertile, though the finding was not statistically significant (OR = 0.68, 95% CI 0.29–1.56).</p> <p>Conclusions: Ninety-day cumulative mortality after cystectomy for bladder cancer is significant and may be associated with hospital cystectomy volume.</p>

22	Perioperative Outcomes of Robot-Assisted Radical Prostatectomy Compared With Open Radical Prostatectomy: Results From the Nationwide Inpatient Sample
Author(s)	Quoc-Dien Trinh, Jesse Sammona, Maxine Sun, Praful Ravi, Khurshid R. Ghani, Marco Bianchi, Wooju Jeong, Shahrokh F. Shariat, Jens Hansen, Jan Schmitges, Claudio Jeldres, Craig G. Rogers, James O. Peabody, Francesco Montorsi, Mani Menon, Pierre I. Karakiewicz
Journal	European Urology 61 (2012) 679–685
Filename	2012_EUrol_Trinh et al
Abstract	<p>Background: Prior to the introduction and dissemination of robot-assisted radical prostatectomy (RARP), population-based studies comparing open radical prostatectomy (ORP) and minimally invasive radical prostatectomy (MIRP) found no clinically significant difference in perioperative complication rates.</p> <p>Objective: Assess the rate of RARP utilization and reexamine the difference in perioperative complication rates between RARP and ORP in light of RARP’s supplanting laparoscopic radical prostatectomy (LRP) as the most common MIRP technique.</p> <p>Design, setting, and participants: As of October 2008, a robot-assisted modifier was introduced to denote robot-assisted procedures. Relying on the Nationwide Inpatient Sample between October 2008 and December 2009, patients treated with radical prostatectomy (RP) were identified. The robot-assisted modifier (17.4x) was used to identify RARP (n = 11 889). Patients with the minimally invasive modifier code (54.21) without the robot-assisted modifier were classified as having undergone LRP and were removed from further analyses. The remainder were classified as ORP patients (n = 7389).</p> <p>Intervention: All patients underwent RARP or ORP.</p> <p>Measurements: We compared the rates of blood transfusions, intraoperative and postoperative complications, prolonged length of stay (pLOS), and in-hospital mortality. Multivariable logistic regression analyses of propensity score–matched populations, fitted with general estimation equations for clustering among hospitals, further adjusted for confounding factors.</p> <p>Results and limitations: Of 19 462 RPs, 61.1% were RARPs, 38.0% were ORPs, and 0.9% were LRPs. In multivariable analyses of propensity score–matched populations, patients undergoing RARP were less likely to receive a blood transfusion (odds ratio [OR]: 0.34; 95% confidence interval [CI], 0.28–0.40), to experience an intraoperative complication (OR: 0.47; 95% CI, 0.31–0.71) or a postoperative complication (OR: 0.86; 95% CI, 0.77–0.96), and to experience a pLOS (OR: 0.28; 95% CI, 0.26–0.30). Limitations of this study include lack of adjustment for tumor characteristics, surgeon volume, learning curve effect, and longitudinal follow-up.</p>

23	The Effect of Hospital Vs. Surgical Volume on Outcomes After Radical Prostatectomy: A Head-Tohead Comparison Using Decision-Curve Analyses ASU abstract
Author(s)	Quoc-Dien Trinh; Maxine Sun; Shahrokh F Shariat; Jesse D Sammon; Marco Bianchi; Wooju Jeong; Jan Schmitges; Khurshid R Ghani; Jens Hansen; Jay Jhaveri, Shyam Sukumar; Paul Perrotte; Piyush K Agarwal, Craig G Rogers, James O Peabody, Mani Menon; Pierre I Karakiewicz
Journal	The Journal of Urology Vol. 187, No. 4S, Supplement, Sunday, May 20, 2012
Filename	2012_JUrol ASU abstract 688_Trinh et al
Abstract	<p>Introduction and objectives: Surgical (SV) and hospital volume (HV) are established determinants of postoperative outcomes after radical prostatectomy (RP). However, a head-to-head comparison between SV and HV has not yet been performed. We assess and compare the effect of SV and HV on postoperative and long-term functional outcomes in a large national series.</p> <p>Methods: A total of 19225 Medicare patients with prostate cancer who underwent RP were identified within the Surveillance, Epidemiology, and End Results Medicare-linked database (1995–2005). First, logistic regression analyses were fitted to assess the predictive effect of SV/HV on postoperative complications within 30-days after RP, blood transfusion, anastomotic stricture, long-term incontinence, and erectile dysfunction. All models were adjusted for patient age, race, comorbidity, marital and socioeconomic status, population density, surgical approach, clinical stage and grade. Second, the discriminant ability of SV and HV for prediction of the examined outcomes was assessed using the concordance index derived from the area under the curve (AUC). Finally, decision-curve analyses (DCA) were used to compare both SV and HV in a head-to-head fashion.</p> <p>Results: In multivariable analyses increasing HV and SV were associated with lower rates of overall complication (HV-OR: 0.99, P=0.003; SV-OR:0.98, P=0.009). In specific complications, SV and HV were independently associated with lower rates of respiratory (P ≤0.003) and vascular complications (P ≤0.01). Higher SV portended lower rates of blood transfusion (OR:0.91, P<0.001). Both HV and/or SV were associated with lower rates of anastomotic stricture (HV-OR:0.98, P<0.001; SV-OR:0.96, P<0.001), urinary incontinence (HV-OR:0.99, P=0.03; SV-OR: 0.98, P<0.001), and erectile dysfunction (HV-OR:0.99, P=0.7; SV-OR:0.98, P<0.001). HV slightly increased the AUC for prediction of complications (65 vs. 64%) and postoperative mortality (72 vs. 69%); SV did not. In DCA, HV achieved higher net benefit relative to SV when a threshold probability ranging from 16–18% was considered.</p> <p>Conclusions: HV and SV are strongly correlated with postoperative outcomes following RP. DCA suggest that hospital volume matters more than surgical volume, especially for older and sicker individuals, who are at high-risk of complications.</p>

24	Volume-Outcome Relationships in the Treatment of Renal Tumors
Author(s)	Robert Abouassaly, Antonio Finelli, George A. Tomlinson, David R. Urbach and Shabbir M. H. Alibhai
Journal	The Journal of Urology Vol. 187, 1984-1988, June 2012
Filename	2012_JUrol_Abouassaly et al
Abstract	<p>Purpose: Outcomes of complex surgical procedures tend to be better for high volume providers, although this has not been clearly established for renal cell carcinoma. We determined the relationship of provider volume with partial nephrectomy and morbidity for renal cell carcinoma treatment.</p> <p>Materials and Methods: We performed a population based, observational study using data on 24,579 patients treated surgically for a renal mass from April 1998 to March 2008. Surgeon and hospital volume quartiles were created using the total number of nephrectomies during the 10-year observation period. The effect of provider volume on partial nephrectomy use, complications and mortality was determined by multivariable logistic regression adjusted for covariates.</p> <p>Results: Partial nephrectomy was done by 10.9% of low vs 24.7% of very high volume surgeons ($p < 0.0001$). A modest decrease in complications was observed with increasing surgeon volume (low vs very high 37.6% vs 34.5%, $p < 0.0001$). The effect of in-hospital mortality was more dramatic with a 1.71%, 1.20%, 0.97% and 0.92% rate for low, intermediate, high and very high volume surgeons, respectively ($p < 0.0001$). After adjusting for covariates, compared to low volume surgeons patients treated by very high volume surgeons had 1.54 times the odds of undergoing partial nephrectomy (95% CI 1.37–1.72, $p < 0.0001$), 0.84 times the odds of an in-hospital complication (95% CI 0.77–0.92, $p < 0.0001$) and 0.69 times the odds of in-hospital death (95% CI 0.47–1.01, $p = 0.16$).</p> <p>Conclusions: Higher volume surgeons perform partial nephrectomy more often, show a lower complication rate and may have a lower in-hospital mortality rate than lower volume surgeons.</p>

25	Volume Outcomes of Cystectomy—Is it the Surgeon or the Setting?
Author(s)	Todd M. Morgan, Daniel A. Barocas, Kirk A. Keegan, Michael S. Cookson, Sam S. Chang, Shenghua Ni, Peter E. Clark, Joseph A. Smith, Jr. and David F. Penson
Journal	The Journal of Urology Vol. 188, 2139-2144, December 2012
Filename	2012_JUrol_Morgan et al
Abstract	<p>Purpose: Hospital volume and surgeon volume are each associated with outcomes after complex oncological surgery. However, the interplay between hospital and surgeon volume, and their impact on these outcomes has not been well characterized. We studied the relationship between surgeon and hospital volume, and overall mortality after radical cystectomy.</p> <p>Materials and Methods: The SEER (Surveillance, Epidemiology and End Results)- Medicare linked database was used to identify 7,127 patients with Urothelial carcinoma of the bladder who underwent radical cystectomy from 1992 to 2006. Hospital volume and surgeon volume were expressed by tertile. The primary outcome measure was overall survival. Covariates included age, Charlson comorbidity index, stage, grade, node count, node density, number of positive nodes, urinary diversion and year of surgery. Multivariate analyses using generalized linear multilevel models were used to determine the independent association between hospital and surgeon volume and survival.</p> <p>Results: When hospital volume or surgeon volume was included in the multivariate model, a significant volume-survival relationship was observed for each. However, when both were in the model, hospital volume attenuated the impact of surgeon volume on mortality while the significant hospital volume-mortality relationship persisted (HR 1.18, 95% CI 1.08–1.30, p <0.01). In addition, the adjusted 3-year probability of survival was significantly correlated with hospital volume in each distinct surgeon volume stratum while survival was not correlated with surgeon volume in each hospital volume stratum.</p> <p>Conclusions: After adjustment for patient and disease characteristics, the relationship between surgeon volume and survival after radical cystectomy is accounted for by hospital volume. In contrast, hospital volume remained an independent predictor of survival, suggesting that structure and process characteristics of high volume hospitals drive long-term outcomes after radical cystectomy.</p>

26	Robot-assisted vs. Open radical prostatectomy: The differential effect of regionalization, procedure volume and operative approach
Author(s)	Jesse D. Sammon, Pierre I. Karakiewicz, Maxine Sun, Shyam Sukumar, Praful Ravi, Khurshid R. Ghani, Marco Bianchi, James O. Peabody, Shahrokh F. Shariat, Paul Perrotte, Jim C. Hu, Mani Menon, Quoc-Dien Trinh
Journal	The Journal of Urology (2012), doi: 10.1016/j.juro.2012.10.028
Filename	2012_JUrol_Sammon et al
Abstract	<p>Background: Utilization of robot-assisted radical prostatectomy (RARP) has increased rapidly, despite the absence of randomized controlled trials demonstrating the superiority of this approach. While recent studies suggest an advantage in perioperative complication rates, they fail to account for the volume-outcome relationship. We sought to compare perioperative outcomes after RARP vs. ORP, whilst fully considering the impact of this established relationship.</p> <p>Methods: Using the Nationwide Inpatient Sample, patients undergoing RP in 2009 were abstracted. Univariable and multivariable logistic regression analyses compared rates of blood transfusions, intraoperative and postoperative complications, prolonged length of stay (pLOS), elevated hospital charges (EHC), and mortality between RARP and ORP, overall and across volume quartiles.</p> <p>Results: An estimated 77616 men underwent RP (RARP: 63.9%, ORP: 36.1%). Low-volume centers averaged 26.2 (RARP) and 5.2 (ORP) cases, very high-volume centers averaged 578.8 (RARP) and 150.2 (ORP) cases. Overall, RARP-treated patients experienced lower rates of adverse outcomes than ORP patients, in all measured categories. Across equivalent volume quartiles, RARP outcomes were generally favorable; however ORP at very high-volume centers produced lower rates of postoperative complications (OR: 0.59 (95%CI: 0.46-0.75)), EHC (0.75 (0.64-0.87)) and comparable rates of blood transfusions (1.38 (0.93-2.02)) relative to RARP at low-volume centers.</p> <p>Conclusion: Regionalization has occurred to a greater extent for RARP than ORP, with an associated benefit in overall outcomes. Nonetheless, low volume institutions experienced inferior outcomes relative to the highest volume centers irrespective of approach. These findings demonstrate the importance of accounting for hospital volume when examining the benefit of a surgical technique.</p>

27	Influence of Surgeon and Hospital Volume on Radical Prostatectomy Costs
Author(s)	Stephen B. Williams, Channa A. Amarasekera, Xiangmei Gu, Stuart R. Lipsitz, Paul L. Nguyen, Nathanael D. Hevelone, Keith J. Kowalczyk and Jim C. Hu
Journal	The Journal of Urology Vol. 188, 2198-2204, December 2012
Filename	2012_JUrol_Williams et al
Abstract	<p>Purpose: While higher radical prostatectomy hospital and surgeon volume are associated with better outcomes, the effect of provider volume on health care costs remains unclear. We performed a population based study to characterize the effect of surgeon and hospital volume on radical prostatectomy costs.</p> <p>Materials and Methods: We used SEER (Surveillance, Epidemiology and End Results)-Medicare linked data to identify 11,048 men who underwent radical prostatectomy from 2003 to 2009. We categorized hospital and surgeon radical prostatectomy volume into tertiles (low, intermediate, high) and assessed costs from radical prostatectomy until 90 days postoperatively using propensity adjusted analyses.</p> <p>Results: Higher surgeon volume at intermediate volume hospitals (surgeon volume low \$9,915; intermediate \$10,068; high \$9,451; p = 0.021) and high volume hospitals (surgeon volume low \$11,271; intermediate \$10,638; high \$9,529; p = 0.002) was associated with lower radical prostatectomy costs. Extrapolating nationally, selective referral to high volume radical prostatectomy surgeons at high and intermediate volume hospitals netted more than \$28.7 million in cost savings. Conversely, higher hospital volume was associated with greater radical prostatectomy costs for low volume surgeons (hospital volume low \$9,685; intermediate \$9,915; high \$11,271; p = 0.010) and intermediate volume surgeons (hospital volume low \$9,605; intermediate \$10,068; high \$10,638; p = 0.029). High volume radical prostatectomy surgeon costs were not affected by varying hospital volume, and among low volume hospitals radical prostatectomy costs did not differ by surgeon volume.</p> <p>Conclusions: Selective referral to high volume radical prostatectomy surgeons operating at intermediate and high volume hospitals nets significant cost savings. However, higher radical prostatectomy hospital volume was associated with greater costs for low and intermediate volume radical prostatectomy surgeons.</p>

28	Hospital Volume, Utilization, Costs and Outcomes of Robot-Assisted Laparoscopic Radical Prostatectomy
Author(s)	Hua-yin Yu, Nathanael D. Hevelone, Stuart R. Lipsitz, Keith J. Kowalczyk, Paul L. Nguyen and Jim C. Hu
Journal	The Journal of Urology Vol. 187, 1632-1638, May 2012
Filename	2012_JUrol_Yu et al
Abstract	<p>Purpose: Although robot-assisted laparoscopic radical prostatectomy has been aggressively marketed and rapidly adopted, there is a paucity of population based utilization, outcome and cost data. High vs low volume hospitals have better outcomes for open and minimally invasive radical prostatectomy (robotic or laparoscopic) but to our knowledge volume outcomes effects for robot-assisted laparoscopic radical prostatectomy alone have not been studied.</p> <p>Materials and Methods: We characterized robot-assisted laparoscopic radical prostatectomy outcome by hospital volume using the Nationwide Inpatient Sample during the last quarter of 2008. Propensity scoring methods were used to assess outcomes and costs.</p> <p>Results: At high volume hospitals robot-assisted laparoscopic radical prostatectomy was more likely to be done on men who were white with an income in the highest quartile and age less than 50 years than at low volume hospitals (each $p < 0.01$). Hospitals at above the 50th volume percentile were less likely to show miscellaneous medical and overall complications ($p = 0.01$). Low vs high volume hospitals had longer mean length of stay (1.9 vs 1.6 days) and incurred higher median costs (\$12,754 vs \$8,623, each $p < 0.01$).</p> <p>Conclusions: Demographic differences exist in robot-assisted laparoscopic radical prostatectomy patient populations between high and low volume hospitals. Higher volume hospitals showed fewer complications and lower costs than low volume hospitals on a national basis. These findings support referral to high volume centers for robot-assisted laparoscopic radical prostatectomy to decrease complications and costs.</p>

29	Multivariate Analyses to Assess the Effects of Surgeon and Hospital Volume on Cancer Survival Rates: A Nationwide Population-Based Study in Taiwan
Author(s)	Chun-Ming Chang, Kuang-Yung Huang, Ta-Wen Hsu, Yu-Chieh Su, Wei-Zhen Yang, Ting-Chang Chen, Pesus Chou, Ching-Chih Lee
Journal	PLoS ONE July 2012, Volume 7, Issue 7, e40590
Filename	2012_PLoS ONE_Chang et al
Abstract	<p>Background: Positive results between caseloads and outcomes have been validated in several procedures and cancer treatments. However, there is limited information available on the combined effects of surgeon and hospital caseloads. We used nationwide population-based data to explore the association between surgeon and hospital caseloads and survival rates for major cancers.</p> <p>Methodology: A total of 11677 patients with incident cancer diagnosed in 2002 were identified from the Taiwan National Health Insurance Research Database. Survival analysis, the Cox proportional hazards model, and propensity scores were used to assess the relationship between 5-year survival rates and different caseload combinations.</p> <p>Results: Based on the Cox proportional hazard model, cancer patients treated by low-volume surgeons in low-volume hospitals had poorer survival rates, and hazard ratios ranged from 1.3 in head and neck cancer to 1.8 in lung cancer after adjusting for patients' demographic variables, co-morbidities, and treatment modality. When analyzed using the propensity scores, the adjusted 5-year survival rates were poorer for patients treated by low-volume surgeons in low-volume hospitals, compared to those treated by high-volume surgeons in high-volume hospitals (P,0.005).</p> <p>Conclusions: After adjusting for differences in the case mix, cancer patients treated by low-volume surgeons in low-volume hospitals had poorer 5-year survival rates. Payers may implement quality care improvement in low-volume surgeons.</p>

Appendix 3: A letter of support

22 October 2013

Dear Dr Rainsberry and Dr Mitchell,

We are writing as the clinical leaders of specialist cancer care and research across the *London Cancer* area in support of the case for change to consolidate specialist cancer services in North London, North East London and West Essex into a limited number of highly specialist hospital sites.

Over the past 18 months, we have worked with our clinical teams, patients, primary care and commissioners to respond to the imperative to improve the outcomes and experience of cancer patients in London. Whilst we have some of the best experts in the country, our specialist services are not organised in a way that gives people the best chance of survival and experience of care.

We have an opportunity to improve the lives of people with cancer by creating world class specialist cancer centres within a comprehensive network of care, delivering the latest treatments, research and medical innovation. Bringing together our expertise, state-of-the-art technology, research and education would drive improvements across whole cancer pathways from the community setting to the most advanced cancer treatments. To do this effectively we know that we would need to concentrate complex and specialist services into high volume hospitals that can sustain the necessary breadth and depth of clinical expertise, attract specialist staff and help support these teams to innovate and continuously monitor and improve their outcomes. This would enable us to build upon the improvements in cancer care that have been seen over the last few years in London while giving the people of North East and North Central London access to the best specialist cancer care in the world. This is what our patients deserve both now and in the future.

We have thoroughly welcomed this opportunity to define our ambition for our services and to propose what we believe will finally achieve truly world-class services for local people and those referred from further afield with cancer. As leaders entrusted with taking forward cancer care, we have a commitment to working collaboratively and in the best interests of our patients at all times to realise these benefits and to measure their impact on outcomes and experience openly and with a drive for constant improvement.

We hope that our vision and arguments are articulated clearly in the case for change and look forward to engaging with stakeholders over the coming months to drive forward these important plans.

We fully endorse the case for change and urge you to support it.

Yours sincerely

 Pelham Allen Chair, <i>London Cancer</i>	 Professor Kathy Pritchard-Jones Chief Medical Officer, <i>London Cancer</i>
 Mr Andrew Elsmore Pathway Co-Director for Brain and Spine cancer Consultant Neurosurgeon	 Dr Jeremy Rees Pathway Co-Director for Brain and Spine cancer Consultant Neurologist
 Mr John Hines Pathway Director for Urological cancer Consultant Urological Surgeon	 Mr Simon Whitley Pathway Director for Head and Neck cancer Consultant Oral & Maxillofacial Surgeon
 Professor Muntzer Mughal Pathway Co-Director for Upper GI cancer Honorary Clinical Professor in Surgery, Consultant Surgeon	 Mr David Khoo Pathway Co-Director for Upper GI cancer Consultant Surgeon
 Dr Kirit Ardeshta Pathway Director for Haematology Consultant Haemato-Oncologist	